POST-CONVENTION ISSUE June 1943

THE FOUNDRY

FIFTY-FIRST YEAR

TECHNOLOGY DEPT.

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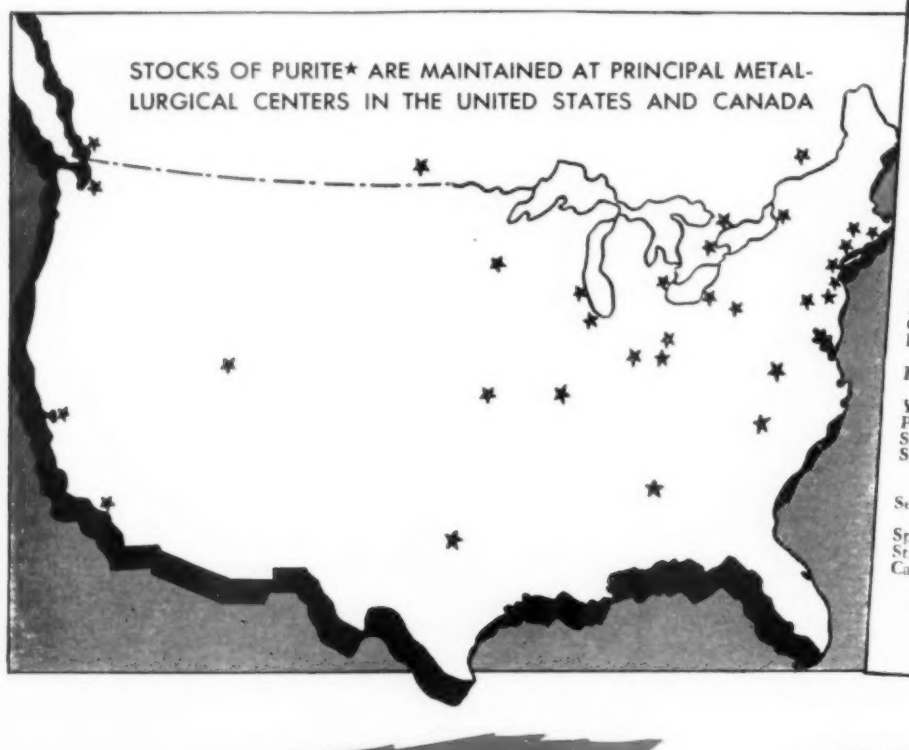
OSBORN

THE OSBORN MANUFACTURING COMPANY
5401 Hamilton Avenue, Cleveland, Ohio, U. S. A.

THE FOUNDRY INDUSTRY DELIVERS THE GOODS!

TODAY foundrymen are producing high-test castings with all-scrap mixtures which meet the rigors of war in every climate from the South Seas to Siberia. Mathieson takes pride in the part Purite is playing in helping to meet the demand for maximum production of sound, dependable castings. In cupola and mixer ladles in gray iron foundries Purite is reducing rejects and speeding production of high-test castings that machine easily and take a high finish. In converter steel foundries Purite is reducing sulfur from over .10% to under .03% in making castings which withstand the strains of war at 80° below zero. In secondary metal refining and in brass melting, Purite is increasing by several percent the yield of sound ingots and castings.

PURITE— Soda ash in its most efficient form for metallurgical use



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S. Obermayer Co.
York, Pa.—North Metal & Chemical Co.
Providence—Sunlight Chemical Co.
Salt Lake City—Utah Foundry Supply Co.
Saltville, Va.—Mathieson's southeastern states plant where Purite is manufactured.
Seattle—Carl F. Miller Co.
Western Foundry Sand Co.
Springfield, Mass—Springfield Facing Co.
St. Louis—M. A. Bell Company
Canada—Railway & Power Engineering Corp. Ltd.
Hamilton — Montreal
Toronto — Vancouver
Winnipeg

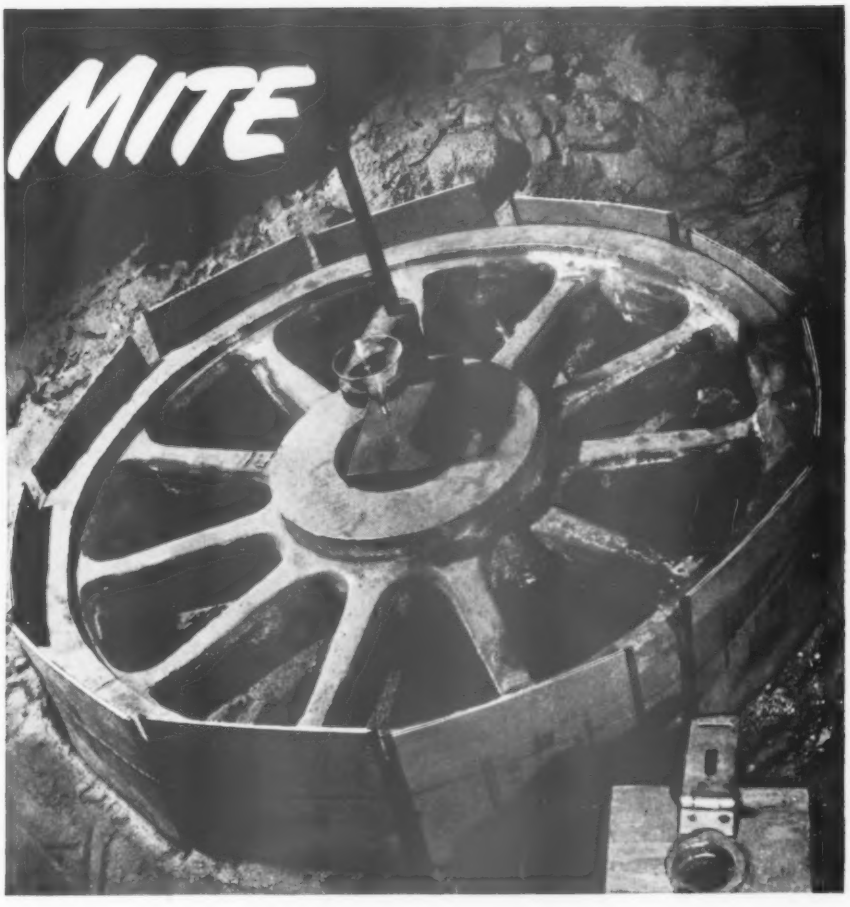
PURITE

THE MATHIESON ALKALI WORKS (INC.)

60 EAST 42ND STREET, NEW YORK, N. Y.

(Licensee of Metallurgical Development Company, Inc.)

$50,000 MITE



It weighs less than 1/100 of an ounce. It is sealed up in a tiny silver capsule, wrapped in cotton, and guarded against injury by a small but strong shell of aluminum alloy. When in use it is guarded at a respectful distance by ropes and glowing red warning bulbs.

It is a 250-milligram pellet of radium sulphate, now on active duty in a Bethlehem Steel plant.

A number of years ago, Bethlehem began to use radium to detect tiny flaws buried out of sight in ponderous marine castings. The intricate design and thick sections of these castings made it practically impossible to avoid small interior cracks or inclusions.

The gamma rays given off by radium have tremendous penetrating power. By placing a radium pellet on one side of a casting and a special sensitized plate on the other, we obtained sharply defined silhouettes of every flaw in the metal.

We then proceeded in much the same fashion as a dentist filling teeth. The defective portion of the casting was excavated until nothing remained but sound, clean steel. The cavity was then filled by welding, annealed to relieve stresses, machined to accurate size, and rechecked by radium pictures.

This method was so successful that in 1936 its use was officially authorized in the production of castings. Today, under the pressures of war, gamma-ray pictures are doing much to speed Bethlehem's production of sound castings for many war uses.

No longer is it necessary to machine a huge rudder post, skeg, or frame hub for several hundred hours, only to uncover at the last moment a hidden flaw that makes rejection inevitable. Nor is it necessary to scrap castings which have been damaged in service. These parts are now salvaged by repair-welding, checked by radiographing, and sent back into action in a fraction of the time necessary to build a new casting from scratch.

Radium is saving thousands of man-hours and machine-hours. It is helping to produce castings and forgings which are superior in strength and soundness.

★ ★ BETHLEHEM STEEL ★ ★

UNIFORMITY

Photo—H Armstrong Ro

in Pups and in Bentonite . . .

A fancier of dogs expects uniformity in a batch of pups like the chows shown above. Careful breeding and selection of stock aids to make his expectations come true.

It is equally true that the foundryman who uses bentonite expects—and receives—uniformity when he uses FEDERAL GREEN BOND.

Uniform strength is ensured by our careful selection of the crude bentonite deposits and laboratory control of every step of its processing.

Uniform grinding—designed to blend quickly with the sand—is the result of grinding on the finest mills obtainable.

Regardless of the type of foundry you have or the use you make of bentonite, it will pay you to use

FEDERAL GREEN BOND

Best of the Bentonites

THE FEDERAL FOUNDRY SUPPLY COMPAN

4600 East 71st Street · Cleveland, Ohio

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THE FOUNDRY

for JUNE 1943

VOLUME 71 NUMBER 6

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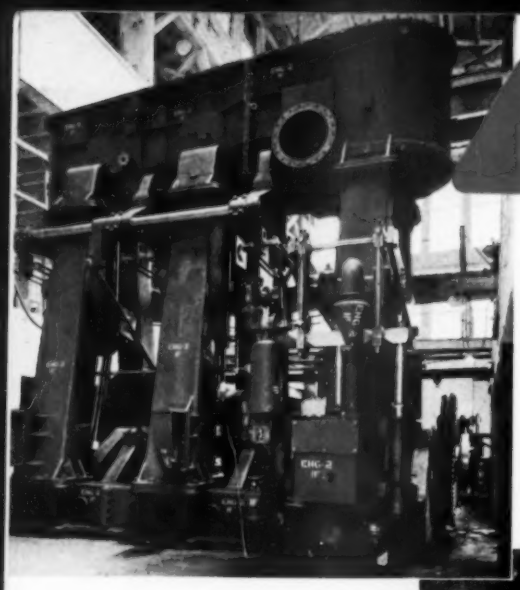
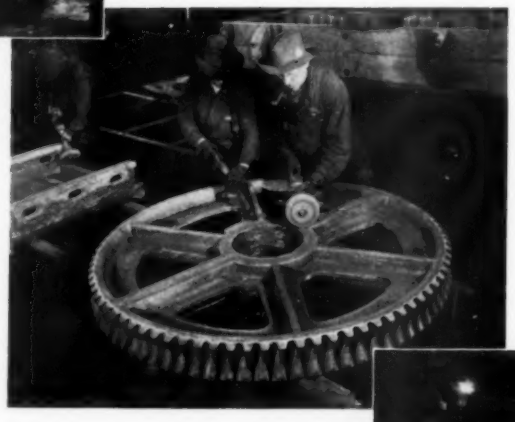


CASTINGS

Western Foundry Co.

Portland, Oregon

Makes Engine Parts for the Wizard Shipbuilder, Henry J. Kaiser; and Finds that All-Linoil Dry Sand Molds as well as Cores is the Fastest, Safest and Best Method. Says Linoil is of Outstanding Merit.



EMPTY DRUMS ARE PRECIOUS

KEEP 'EM ROLLING

Return all empties promptly—at least once a month . . . PROTECT THEM FROM DAMAGE.

TOP: Kaiser Liberty Ship Engine finished and assembled by Iron Fireman Co. and Willamette Iron and Steel Co., Portland. All castings are made in Portland foundries. MIDDLE: Liberty Ship Engine gear. The teeth are made in Linoil cores. BOTTOM: Pouring the cylinder casting shown on opposite page. Both the cores and the molds are made with dry sand and Linoil. BELOW: Part of main bay in cylinder foundry at Western Foundry Co., Portland.

Linoil means less oil per ton of cores, less gas in the mold, fewer blown castings. Linoil means less time in the cleaning room, less time in the ovens, less time at the core bench. Linoil means porous, evenly dried, true to the corebox cores. Linoil means non-moisture-absorbing cores, non-metal-agitating cores, cores non-resistant to contraction of metal. Linoil means really efficient founding.

THE WERNER G.

(DIVISION OF ARCHER

2191 WEST 110 STREET WOODBINE

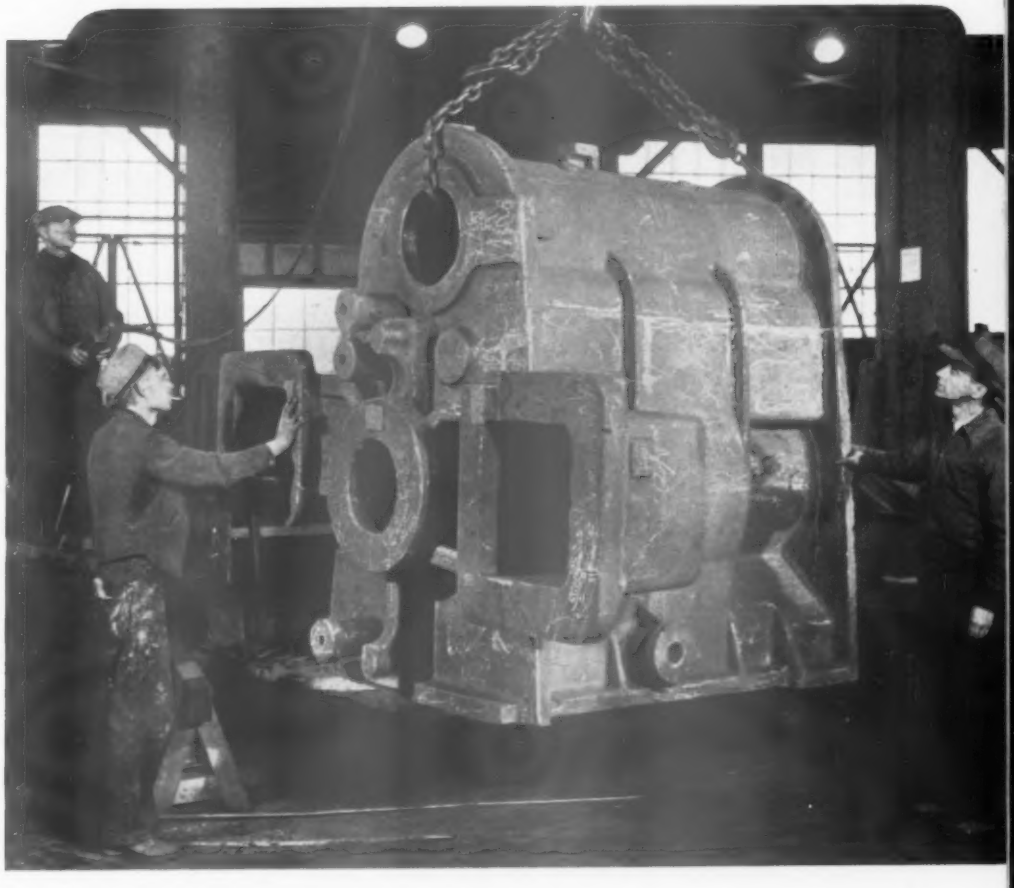
FOR KAISER

"We have successfully used Linoil in our core production for four to five years. We believe its higher binding and quick drying properties make it the outstanding core oil on the market today. We have realized a substantial saving in our core production through the use of this product and take pleasure in recommending it to the trade," writes Lee W. Carr, Assistant Manager of

Western Foundry Company, Portland, Oregon, engineers and manufacturers of grey iron and alloy castings. No patterns used in making the 2500 h.p. high-pressure cylinder below, the 8-ton casting being made completely in Linoil cores.

LINOIL

When . . .
Foundry-
men say..
"It's Uniform"
they mean
UNIFORM



SMITH COMPANY

(DANIELS - MIDLAND COMPANY)

CLEVELAND, OHIO

REASONS FOR

THIS is a war of fire power. Regardless of the courage of our armed forces, regardless of the inspired leadership of our generals and their strategists—our armies must have superior fire power to win.

Fire power means more bombs, more ships, more planes, more tanks than any army has ever had before. It means the overcoming of production bottlenecks, the establishing of new production records, the delivery of new weapons, and machines with which to produce those weapons.

Pangborn Corporation, in company with the front line of American industry, recently won the Army-Navy "E" pennant for excellence in war production. This citation came because Pangborn Blast Cleaning and Dust Control equipment is playing an important part in speeding up the fire power

WORLD'S LARGEST MANUFACTURER OF BLAST CLE

PANG

PANGBORN CORPORATION ★ ★★

R CONFIDENCE

of the United Nations armies by helping, day and night, get *more* fighting equipment into *more* fighting men's hands. Our ROTOBLAST Barrels, Tables and Special Cabinets—our AIR BLAST Rooms and Special Machines are removing scale and dirt from hundreds of thousands of castings, forgings, stampings, heat treated and other metal parts daily to help SPEED UP the fire power that is so badly needed NOW.

Pangborn men and management can, and WILL, do more. If you have a blast cleaning or dust control problem—"come to Pangborn." The recent citation—proudest in our 39 years of progress—plus the efficiency and performance built into every Pangborn machine—are irrefutable reasons for your complete confidence.

Bulletins available for all latest type equipment upon request.

CLEANING AND DUST CONTROL EQUIPMENT

BORN

★★ ★ HAGERSTOWN, MARYLAND

CHAMPION

CORE BLOWERS

are producing perfect cores for aluminum and magnesium as well as all other kinds of ferrous and non-ferrous metals

Champion's core production record is a story of success in blowing all kinds of cores from the simplest to the most complex. They have proved equally efficient on small and large work. Ramming time is the same regardless of the core size, and every Champion rammed core is uniformly accurate. The operator, man, woman or child, merely sets the box, pulls the lever, and the core is perfectly rammed. A single valve operates the core box clamp, clamps same against the blow plate, blows the core, exhausts and releases the clamps in the proper cycle.

AN UMBRELLA OF PLANES
to cover our Military and Naval actions

AN UMBRELLA OF CHAMPION CORE BLOWERS
to produce airplane engine parts

Let a Champion engineer analyze your core production requirements. His experience has given him the answer to many knotty problems which may be perplexing your core department.

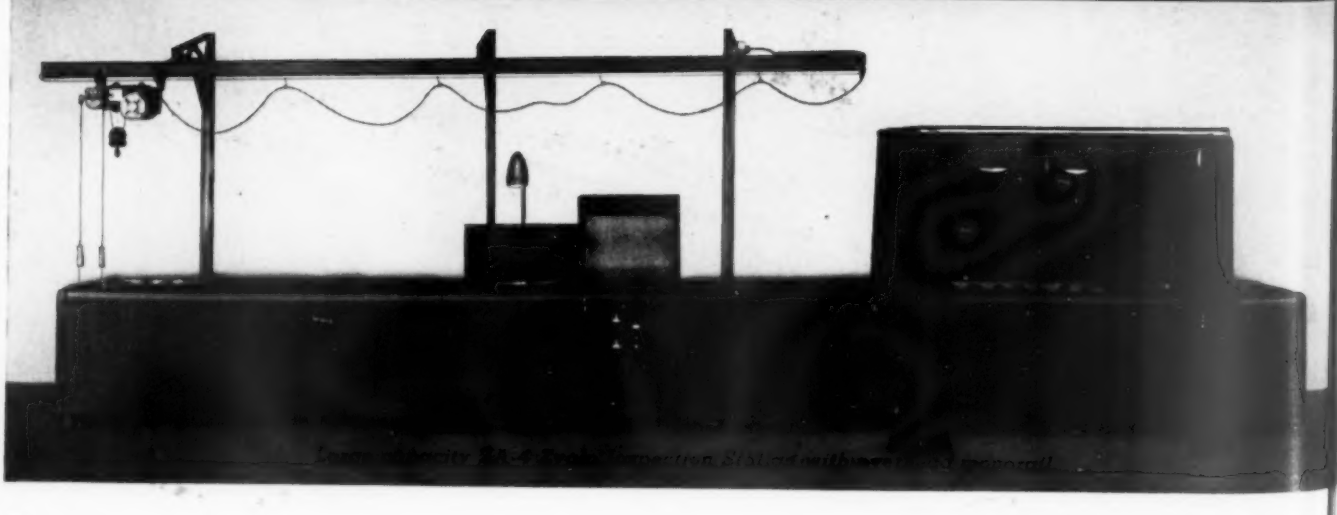
CHAMPION
Foundry & Machine Co.
1318 W. 21st Street, Chicago

OUT OF THE DARKNESS COMES

Zyglo

(REG. U. S. PAT. OFF.)

TO PUT THE FINGER ON FAILURE



Zyglo Inspection Unit with Fluorescent Light and Ultraviolet Light Equipment

The New Inspection Method Now Ready to Speed Your Output of Perfect Castings [NON-MAGNETIC AS WELL AS MAGNETIC]

An Informative Bulletin Also Ready

● Zyglo Black-Light Inspection now takes its place beside the original Magnaflux (magnetic) Method as Industry's means of predicting areas of probable failure in castings of *non-magnetic* metals. Announced some months ago, Zyglo has inspected many thousands of cast metal parts going into assemblies of war equipment—magnesium, austenitic steels, stellite—even plastics and ceramics. These have had the finger of Zyglo indications put on them before they could carry a defect into finished products—long before the possibility of failure in battle. Another factor in the supremacy of American arms!

In the illustration, here, of aluminum castings—dipped in a penetrant fluorescent liquid, then rinsed, dried powdered and observed under black light—serious shrinkage cracks were shown up. The glowing fluorescent indications signal the exact locations in which the penetrant remained during rinsing, then developed finally on the surface under capillary action by the powder.

Zyglo, with its laboratory years behind it, has met the test of the production line with thoroughly practical results: *Clear, easily interpreted indications. Routine handling without delaying the flow of work. Big direct savings of labor, wasted when defective parts are assembled. Enormous indirect savings through prevention of failures.*

To fit Zyglo, into foundry routine, a line of equipment has been developed. A complete compact unit and an arrangement of larger capacity units are shown below to indicate the range of accessories. Not only the practical equipment is available to licensed Zyglo users, but the full Magnaflux Service. This amounts to a continuing consulting and engineering service on flaw detection.

A great percentage of American manufacturing will find applications for Zyglo in the competition of the final war and early postwar years. You are urged to contact the Magnaflux Corporation to determine definitely the advantage of Zyglo in your foundry. Write, requesting the new Zyglo Bulletin.

Complete Zyglo Inspection Station ZA-2D for small volume or laboratory.

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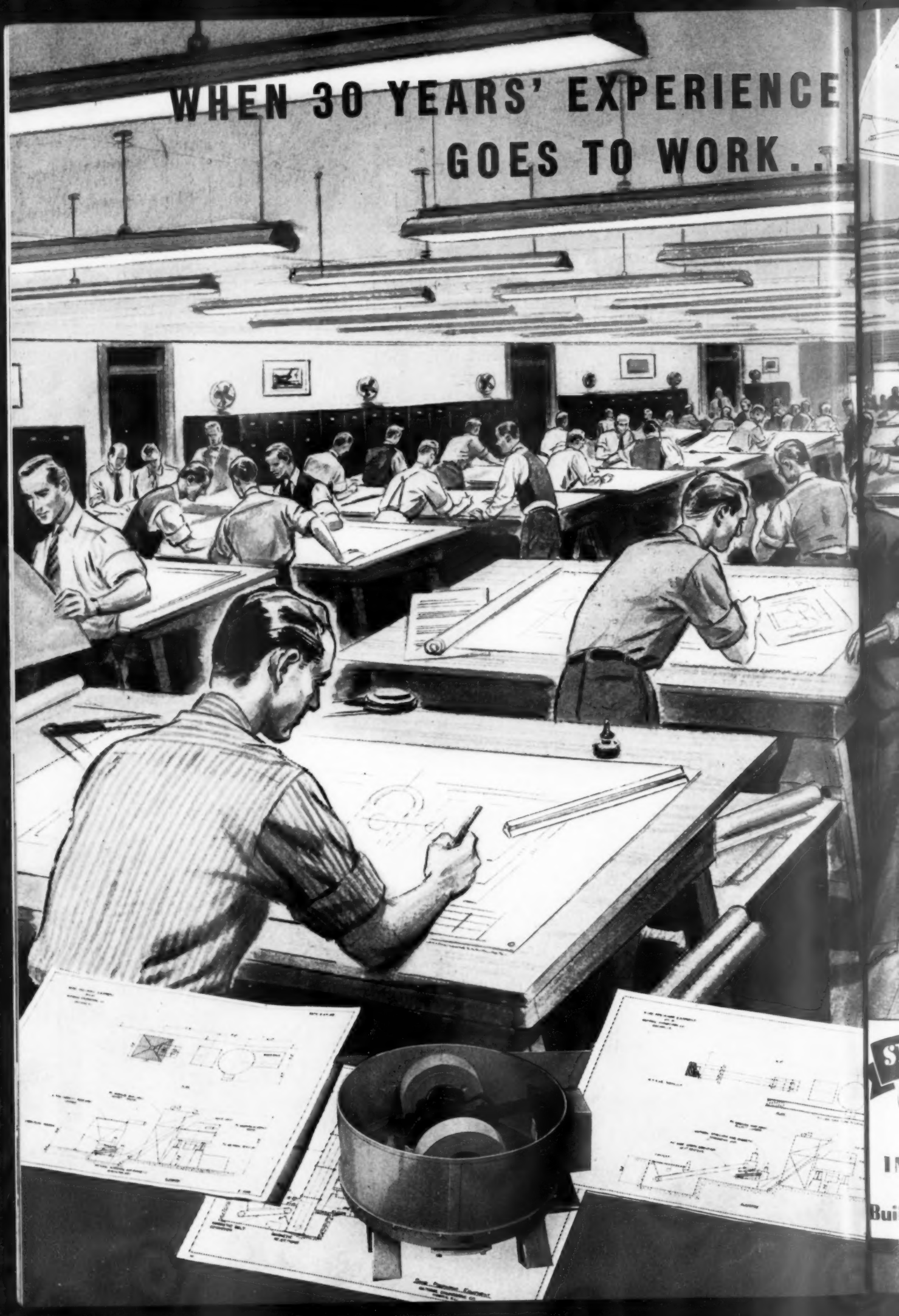
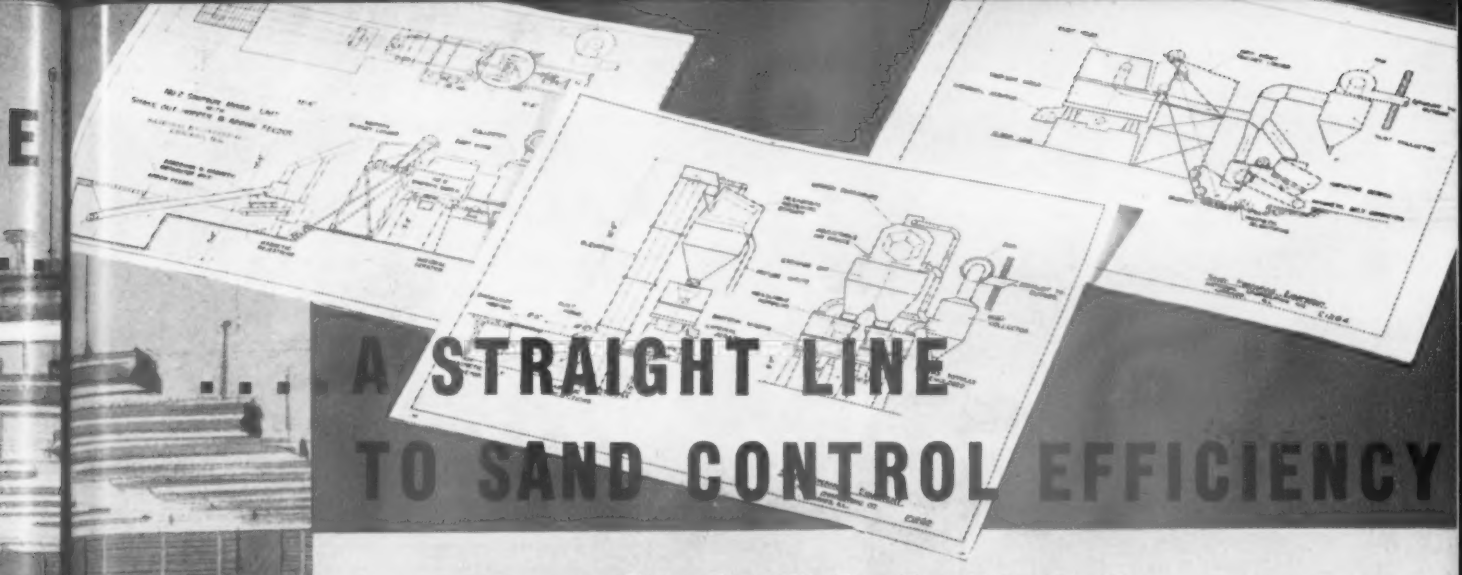
5918 Northwest Highway
Chicago

NEW YORK DETROIT DALLAS LOS ANGELES

MAGNAFLUX CORPORATION


WHEN 30 YEARS' EXPERIENCE
GOES TO WORK . . .



. . . A STRAIGHT LINE TO SAND CONTROL EFFICIENCY

NATIONAL *Engineering Service*

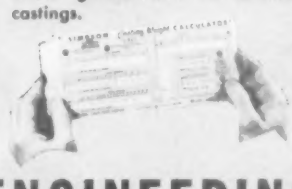
FOUNDRY Sand Control Engineering has been the special province of National Engineers for more than 30 years. During this time they have designed and engineered sand systems and equipment for hundreds of foundries, large and small, of all types: magnesium, aluminum, iron, steel, brass and bronze. They have helped foundries produce the highest quality castings at the lowest net cost per ton.

A broad background of practical foundry experience and years of concentration on the proper solution to foundry sand problems equips National Engineers to layout, design and build the right system for the special requirements of any foundry. This means top operating efficiency is achieved — and maximum production with savings in time, labor, power and materials possible in nearly every case.

If you are seeking the shortest route to proper sand preparation, handling, reclamation, storage and control let National Engineering experience help you. Whether it is a problem of today or part of your long range planning, a National Engineer will gladly work it out with you.

FIELD SERVICE
National engineers are on the job constantly helping foundries solve problems of sand handling and control on construction, maintenance, repair or new requirements.

CASTING WEIGHT CALCULATOR
Many thousands of these simple, easy-to-use calculators have been distributed throughout the foundry industry. They help save time and avoid guesswork in estimating castings.



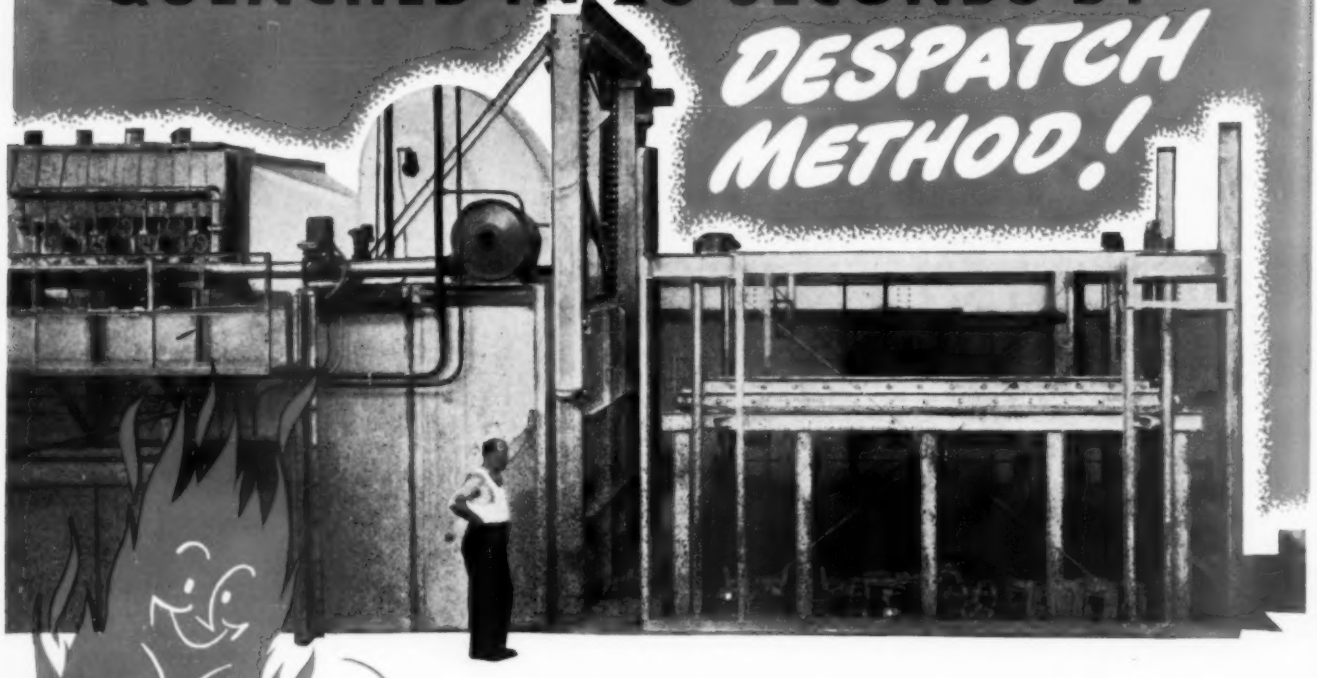
SERVICE MANUAL
This Service Manual is helping keep National Equipment operating at top efficiency. Containing complete installation, maintenance, operating and lubrication details it is on hand wherever National Products are working.

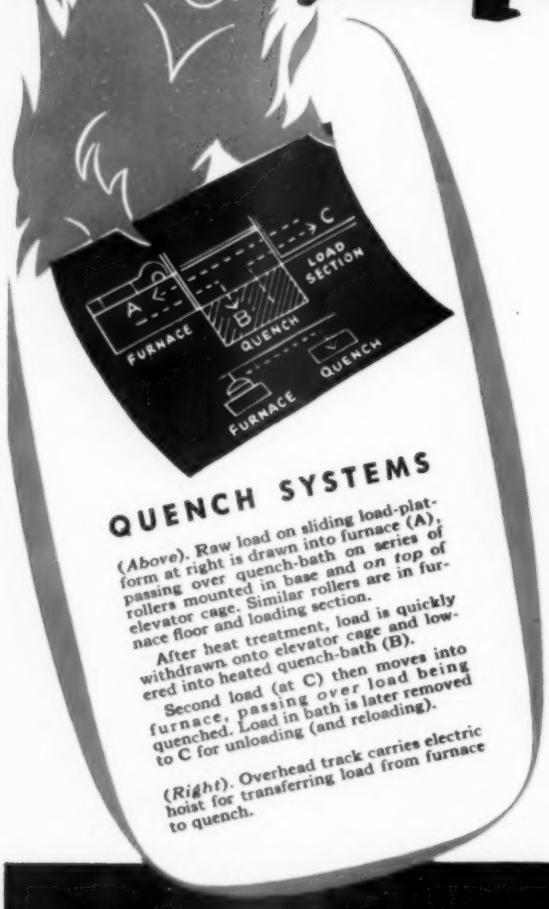
NATIONAL ENGINEERING COMPANY

MACHINERY HALL BUILDING • CHICAGO, ILLINOIS

Manufacturers and Selling Agents for Continental European Countries:—The George Fischer Steel & Iron Works, Schaffhausen, Switzerland. For the British Possessions, Excluding Canada and Australia—August's Limited, Halifax, England. For Canada—Dominion Engineering Co., Ltd., Montreal, Canada. For Australia and New Zealand—Gibson, Battle & Co., Pty., Ltd. Sydney, Australia

80 OR 8000 LBS. OF AL. CASTINGS QUENCHED IN 20 SECONDS BY DESPATCH METHOD!





QUENCH SYSTEMS

(*Above*). Raw load on sliding load-platform at right is drawn into furnace (A), passing over quench-bath on series of rollers mounted in base and on top of elevator cage. Similar rollers are in furnace floor and loading section.

After heat treatment, load is quickly withdrawn onto elevator cage and lowered into heated quench-bath (B).

Second load (at C) then moves into furnace, passing over load being quenched. Load in bath is later removed to C for unloading (and reloading).

(*Right*). Overhead track carries electric hoist for transferring load from furnace to quench.

Because *fast* quenching notably improves the quality of aluminum castings after accurate, uniform heat treatment, Despatch furnaces may be obtained with fastest possible quench systems.

The radiant-tube indirect gas-fired Despatch furnace shown above accommodates 8,000 lb. loads in its 15 ft. work chamber. Yet a capacity load, following treatment (which provides ± 5° F. uniformity), can be withdrawn and dropped into controlled-temperature quench bath in *20 seconds*.

37% increase in tensile and 31% greater elongation in heat-treated aluminum castings are the result of this effective Despatch furnace-and-quench combination. Furnace also handles magnesium.

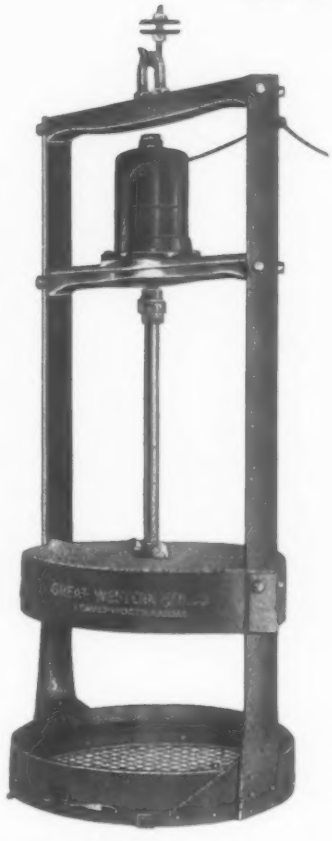
Despatch pot-type furnace; electrically heated. Available in sizes 12"x8" (basket diam.-depth) to 60"x60".

DESPATCH OVEN COMPANY MINNEAPOLIS

WIRE OR PHONE TODAY
for latest data on Despatch Furnaces for Aluminum or Magnesium

Combs
GYRATORY FOUNDRY RIDDLES

Over 10,000 Machines in Operation; Immediate Shipment



Type "CR" . . . . . .

FOR SCREENING . . . Moulding and Core Sands Medium Fine, Coarse Dry and Sticky Materials.

24" dia. Sieve is held in place by a perfected clamping device. . . . Sieve is easily removed, dumped and replaced in about five seconds. . . . This machine has a capacity of at least 20 men riddling by hand. Special Vertical ⅓ R. P. geared head motor, totally enclosed, operates machine at about 287 R. P. M. . . . This slow motion, together with about 3" circle of gyration, thoroughly SIFTS, MIXES, AERATES and FLUFFS the sand. . . . Capacity equal to at least 20 men riddling by hand. . . . Dust-proof ball bearings are used. . . . Height 4'-6" overall. Weight 260 pounds.

Price complete $215.00

Type "V" . . . . . .

FOR SCREENING . . . Moulding and Core Sands, Medium Fine and Coarse Dry Materials. 20" dia. Sieve is held in place by a perfected clamping device.
This permits removing and replacing sieve in about five seconds.
This machine has a capacity equal to 10 men riddling by hand.
Driven by a Special 1/6 H.P. totally enclosed motor equipped with ball bearings. Merely plug in on any light or power circuit.
5 feet high over all.
Weighs 100 pounds, making it possible for one man to carry it from place to place. Also made with 36" dia. Sieve, this being our type V-5".

Price complete, Type V $175.00
Price complete, Type V-5 . . . . $310.00

Extra Screens Save Money

Rims are made of heavy steel. Bottoms of extra heavy galvanized after woven wire cloth.

Type "CS" . . . . . .

FOR SCREENING . . . Moulding and Core Sands Medium Fine, and Coarse Dry Materials.

24" Square Sieve. . . . Machine makes two separations. . . . Screened material passes through the sieve and refuse tails off to one side. . . . No need to dump sieves. . . . Permits of continuous shoveling. . . . Special vertical geared head motor, ⅓ H. P., totally enclosed, operates machine at approximately 287 R. P. M. . . . Has about 3" circle of gyration, which thoroughly SIFTS, MIXES, AERATES and FLUFFS the sand. . . . Capacity equal to at least 20 men riddling by hand. . . . Dust-proof ball bearings used. . . . Height 4'-10" overall. Weight, 304 pounds.

Price complete $225.00

30 Days Free Trial Offer . . . Write Us.

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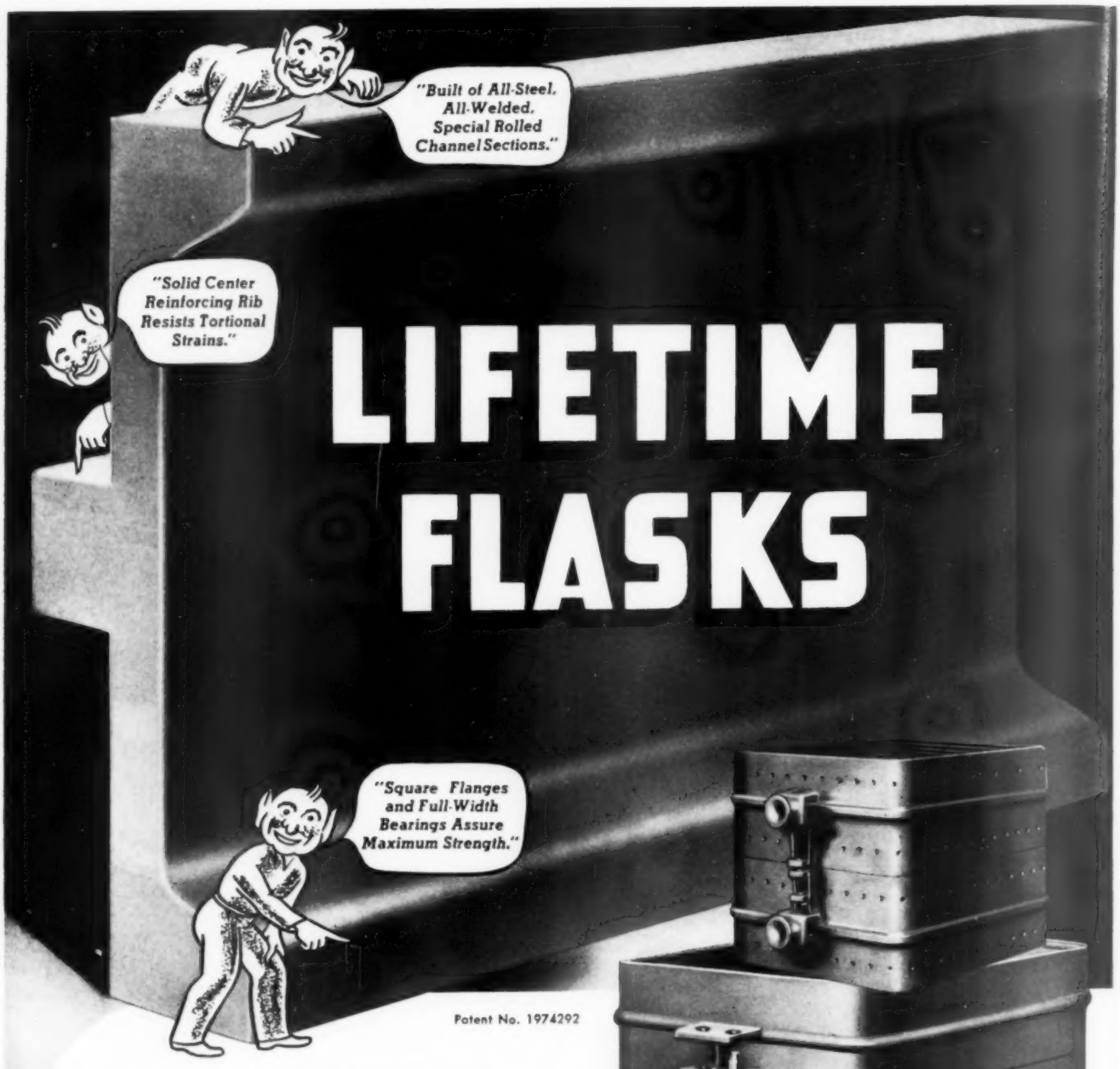
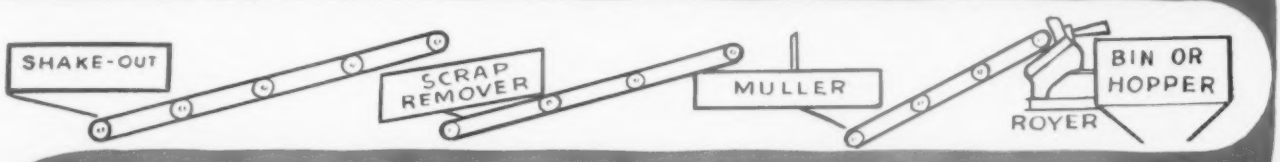
LEAVENWORTH, KANSAS


"Built of All-Steel, All-Welded, Special Rolled Channel Sections."
"Solid Center Reinforcing Rib Resists Tortional Strains."
"Square Flanges and Full-Width Bearings Assure Maximum Strength."
LIFETIME FLASKS
Patent No. 1974292

To meet today's vital war production schedules, you need Sterling LIFETIME Foundry Flasks — flasks that are unusually compact and rugged, engineered on standards of indestructibility. That's why Sterlings are the preferred flasks in more than 3500 American foundries. All styles and shapes available.

A 4087-1P

AVOID HOT SAND



By Installing a Royer in Your Sand System

NOTICE

Royer equipment is sold only by experienced, factory-trained engineers who are qualified to advise you on the type of unit best suited your conditions. Our representatives have sold Royers for years, and each has satisfactorily serviced hundreds of foundries.

The tempo of war-time production frequently does not allow sufficient time for sand to cool before it is used again; a common cause of molding troubles and defective castings.

In hundreds of foundries with sand systems, this problem has been liquidated by installing a Royer Sand Separator and Blender between the muller and sand storage. These foundries enjoy open, velvety sand—cooled and conditioned as only the double aeration and exclusive "combing belt" action of the Royer can do it. Such sands make better molds and smoother finish castings which require less cleaning. Drops, skids, run-outs and discount are sharply reduced.

The Royer Stationary Models "D" and "R" shown are designed expressly for use in sand systems. The savings effected by all Royers reach a high point in these units. Model "D" has a capacity of 24 to 30 tons of sand per hour; Model "R" of 40 to 50 tons per hour. *They provide positive lump breaking, thorough mixing and blending, even distribution of moisture, increased permeability and double aeration; on the belt and in discharging.*

There's a Royer among the eight stationary and portable models to meet the sand conditioning needs of every foundry. Over 5,000 are in use today. Write for full information.

THE ROYER

ROYER FOUNDRY & MACHINE CO. *KINGSTON, PA.*

THOSE POST-WAR PRODUCTION PROBLEMS . . .

LET'S TACKLE THEM

Comprehensively

OUT FRONT. Wheels are whirring. Men — and women — are bearing down. Output is mounting to new levels. Our fighting forces must have enough and in time. Tunisia is only the first faint tick toward counting out the Axis.

IN BACK. The engineering department is at work. Machines and products are being redesigned. Old standards of excellence won't do. This activity behind the scenes, perhaps not so obvious or spectacular, is, if anything, even more intense.

THE outcome? After the war, new machines, new products, new standards of quality in every field — necessarily. And when they appear, think what will be expected of them! Today's exceptional records will be mere routine then. Present achievements in *quality* will become only a taking-off point to still higher *quality*. In that world our new models will have to hold their own — and *keep on advancing*.

Future progress is being planned now. Every experience that can be covered in the design and construction of post-war equipment will make that equipment just so much better. Every difficult job that can be described and conquered now will make that equipment just so much more efficient and comprehensive. By "comprehensive" we mean able to handle more work and more kinds of work more speedily and more profitably — of a higher quality.

Problems? Plenty of them, certainly. Increasing daily in both number and complexity, because of war's unprecedented demands. *Will you share them with us?* SPO Molding Machines have always reflected practical foundry conditions. They always will. And they will be all the more applicable to your precise needs if you will help us build your experience into them.

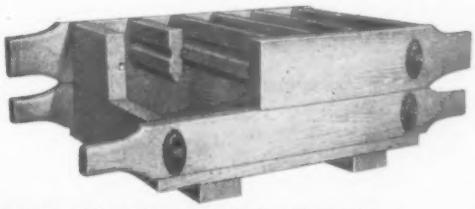
SPO Incorporated

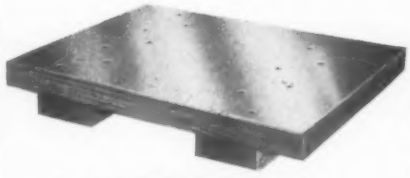
SPO

INCORPORATED

Manufacturers and Specialists in Molding Machines, Vibrators and Patterns for Production

7500 GRAND DIVISION AVENUE • • CLEVELAND, OHIO





CMD WOOD FLOOR FLASKS

Made of No. 1 grade Norway Pine, with **strong reinforcing rods,** one-half inch thick, inside cope and drag. On **large sizes,** where cope or drag is over 8 inches in depth, **double tie rods** are used. Cross bars can be shaped and beveled to conform to the contour of your pattern. One bottom board is furnished with each flask.

CMD NON-WARP, NON-BURN COMPOSITION JACKETS

Made of strong light-weight **fire-safe "Linasbestos"** are non-burning and non-warping. They are heavily reinforced not only with thick angle iron corners but with **angle iron braces all around the sides and ends.** Handles are bolted on.

CMD FIRE-RESISTANT BOTTOM BOARDS

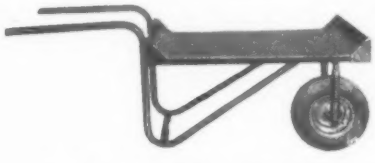
The surface of these long-life bottom boards is made practically fire-proof by a highly efficient covering of **"Linasbestos,"** which is wood-screwed to the board and cleats. Only CMD Bottom Boards can offer you **"Linasbestos"** protection. Available in any sizes.

Ask For

CMD

FOUNDRY SPECIALTIES

Because war time is no time to experiment, foundrymen, more and more, are turning to CMD for flasks, jackets, core conveyors, chipping hammers, crucible skimmers and other foundry specialties. CMD products have proved their worth; and reflect 22 years of leadership in meeting the specialized needs of the foundry industry. Write for illustrated circulars on the complete CMD line.

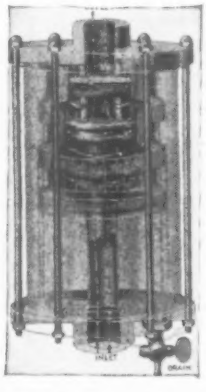


CMD PNEUMATIC CORE BARROW

In busy, crowded places around your foundry, this **easy-to-handle CMD Core Barrow** speeds up safe delivery of large cores to molders.

TRI-PLY FOUNDRY RIDDLE

Split-proof frame is made of three plys of hardwood. Screen of the finest galvanized wire (of any popular mesh desired) is tightly assembled and **thoroughly stapled to frame.**



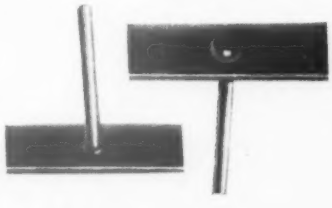
TEXTITE AIR SEPARATOR

Cools, cleans and dries the air in one operation. **No moving parts** to replace. Saves air tools. Write for illustrated circulars.

CHICAGO MANUFACTURING & DISTRIBUTING CO.

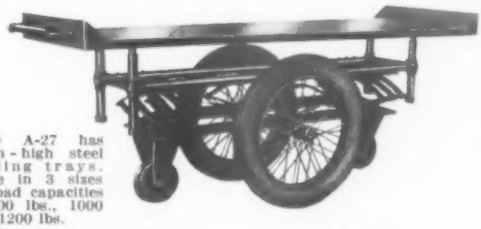
Dept. 6F, 1928 West 46th Street

CHICAGO, ILLINOIS



SLAG SKIMMING AND RABBLING IRONS

Made of high heat-resisting wrought iron. Handles upset on both sides of plate. **Quantity production** at **low cost.**



Type A-27 has bench-high steel loading trays. Made in 3 sizes for load capacities of 800 lbs., 1000 lbs., 1200 lbs.

CMD PNEUMATIC CORE TRUCKS

Minimize core chafing and breakage and **reduce core-handling cost 50 to 75 per cent.** They have in addition to pneumatic tires and elliptical springs an exclusive inner coil spring in each upright support that assures maximum resilience even under light loads.

"The Speedslinger Is the Heart of Our Foundry"

SAYS W. F. GOLLMAR, VICE PRES. AND GENERAL MANAGER, ELYRIA FOUNDRY

Speedslinger equipped jobbing foundries frequently employ the B&P Portable Sand Conditioner when elaborate sand handling systems are not practical. This inexpensive unit is capable of screening, tempering, magnetically separating and pilling 20 cubic feet of sand per minute. Elyria Foundry uses two Portable Sand Conditioners, one of which is shown here with method of loading and Speedslinger portable tank.

The Motive Type Speedslinger at Elyria Foundry rams 250 tons of sand in 5 hours, producing gray iron castings from molds three feet square up to molds 12 feet wide by 24 feet long, including pit molds and large tapes. On one job where they formerly got three castings weekly from two patterns, the Speedslinger now makes three castings daily from one pattern.

This Morton Milling Machine casting was Speedslinger rammed at Elyria Foundry.

The Better Method in this large gray iron jobbing foundry makes castings ranging in size from 1 pound to 80,000 pounds

Both Speedslinger and Speedmullor, as well as two Portable Sand Conditioners and four Screenarators, are products engineered and installed by The Beardsley & Piper Co. for the Elyria Foundry. And when W. F. Gollmar says "the Speedslinger is the heart of our foundry," he knows whereof he speaks. His experience with the Better Method of ramming dates back to 1925 when they installed a Portable Type Sandslinger which was replaced in 1929 by a Motive Type Sandslinger which paid for itself many, many times, according to Mr. Gollmar.

Since satisfied users are the truest endorsement of any foundry equipment, why hesitate to consult a Beardsley & Piper Co. engineer about foundries like yours, making the same kind of castings as you are making. Most frequently, we are able to reduce costs and speed up production.

THE BEARDSLEY & PIPER CO.

2541 N. Keeler Avenue, Chicago, Ill.

FOR Small WORK ON Big SCHEDULES

"NICHOLLS" HEAVY DUTY Molding Machines

Type 16-M Jolt Squeezer

SIMPLE Rugged Construction insures successful production. This type 16-M Heavy Duty Jolt Squeezer machine was designed especially for steel foundry service, with a hard jolt required when making molds for steel castings.

This machine is provided with an interlocking means which insures the head being in the squeezing position before the squeeze valve can be operated. The squeeze head is operated to and from the squeezing position with ease.

The base and squeeze cylinder is a heavy one piece semi-steel casting. All pins and bushings are case hardened and ground to size. The squeeze valve can be removed without disturbing any piping. The machine requires a minimum of floor space.

Your inquiries are solicited. One of our engineers will call at your request.

Wm. H. NICHOLLS Co., Inc.
RICHMOND HILL, LONG ISLAND, NEW YORK

Established 1910

Foreign Manufacturers and Selling Agents—
For Continental Europe and Great Britian—The George Fischer Steel and Iron Works, Shaffhausen, Switzerland.

NICHOLLS

MONTREAL, Canada
Canadian Foundry Supplies & Equipment, Ltd.

TORONTO, Canada
Canadian Foundry Supplies & Equipment, Ltd.

BUFFALO, New York
Queen City Sand & Supply Co.

PHILADELPHIA, Pa.
Pennsylvania Foundry Supply & Sand Co.

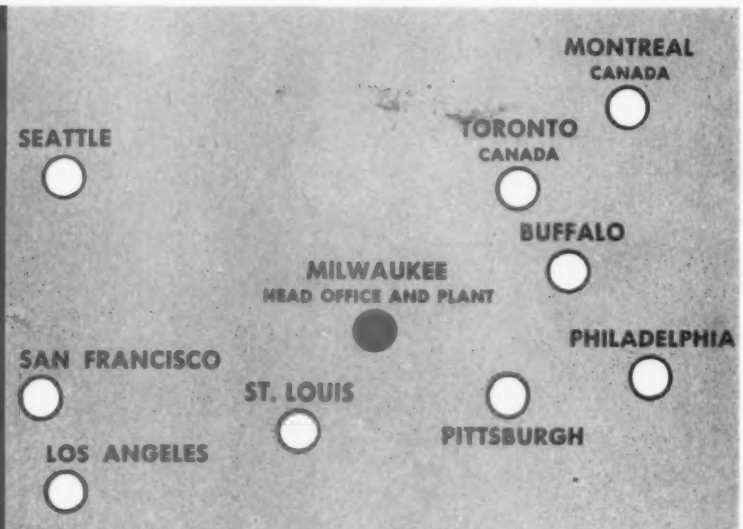
PITTSBURGH, Pa.
The S. Obermayer Co.

ST. LOUIS (Edwardsville, Ill.)
Midwest Foundry Supply Co.

SEATTLE, Wash.
Carl F. Miller Co.

SAN FRANCISCO, Cal.
Industrial Supply Co.

LOS ANGELES, Cal.
Independent Foundry Supply Co.



STRATEGICALLY LOCATED DISTRIBUTORS PROVIDE IMMEDIATE SHIPMENTS OF

DELTA FOUNDRY PRODUCTS

No matter where your foundry is located there is an authorized, exclusive DELTA FOUNDRY PRODUCTS distributor convenient to you; and from stocks on hand will make immediate shipments of your orders.

In foundry centers all over the North American Continent the name DELTA is intimately and favorably known.

DELTA PRODUCTS are the result of resourceful research based on a thorough understanding of foundry problems and,

DELTA'S uniform high quality is the result of unceasing vigilance in up-to-date, scientific laboratories manned by skilled professional personnel.

Ask your nearest distributor for information on the complete line of DELTA FOUNDRY PRODUCTS or write direct to

For Steel —
DELTA CORE & MOLD WASH

For Grey Iron & Malleable —
DELTA GRAKOAT

For Non-Ferrous Metals —
DELTA NON-FERRUSKOAT

For Heavy Grey Iron —
DELTA BLAKOAT

For Core Joints —
DELTA MUDDING COMPOUND

To Eliminate Skin Drying and Dry Sand Mold Work —
DELTA SPRAY BINDERS

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DELTA PARTEX, The Nut Shell Parting

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DELTA CORE OILS

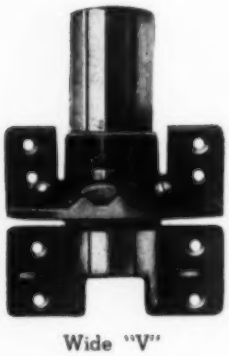
DELTA OIL PRODUCTS CO.

MANUFACTURERS OF
INDUSTRIAL AND AUTOMOTIVE OILS, GREASES AND COMPOUNDS
MILWAUKEE • WISCONSIN

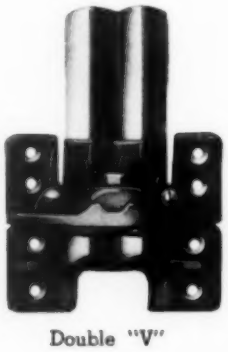
Adams Cherry Slip Flasks

These flasks are made to your specifications, with any desired length, width or depth. Material is close-grained cherry lumber, with machined malleable trimmings.

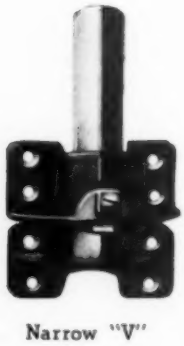
The sand strip mechanism is convenient and quick-acting and it will stand up under the squeezing and jolting of power machines. For greatest efficiency, try the Adams Cherry Slip Flask in combination with Adams Jackets.



Wide "V"



Double "V"



Narrow "V"

Pins to Suit Your Preference

Wide-V pins are furnished unless otherwise specified. We can supply double-V, narrow-V, round or other styles of pins to conform with your present pattern plates.

The Adams Company

1883—Our 60th Year—1943

800 Foster St., Dubuque, Iowa

MOLDING MACHINES **ADAMS** **FLASK EQUIPMENT**

BLACK HILLS BENTONITE PUTS 4 *Big Advantages* AT YOUR FINGERTIPS!

Black Hills is a pure colloidal Wyoming bentonite which gives you four distinct advantages:

1. RESILIENCE. In this property Black Hills surpasses all other bond clays. Result: less trouble with difficult lifts, less breakage of corners and mold edges.
2. GREEN STRENGTH. Very high, reducing amount needed and leaving less dead clay in sand.
3. DRY STRENGTH. Another "first". Higher than for any other bonding clay. Protects against cuts and washes, particularly in steel foundry practice.
4. HOT STRENGTH AND PERMEABILITY. "Tops" again in this double-barrelled respect. Unequalled in this combination of values by any other clay.

Even so, Black Hills Bentonite may not exactly suit your purpose. In all, ECP offers you FIVE different bonding clays, together with many combinations, from which to arrive at the one right answer to your problem.

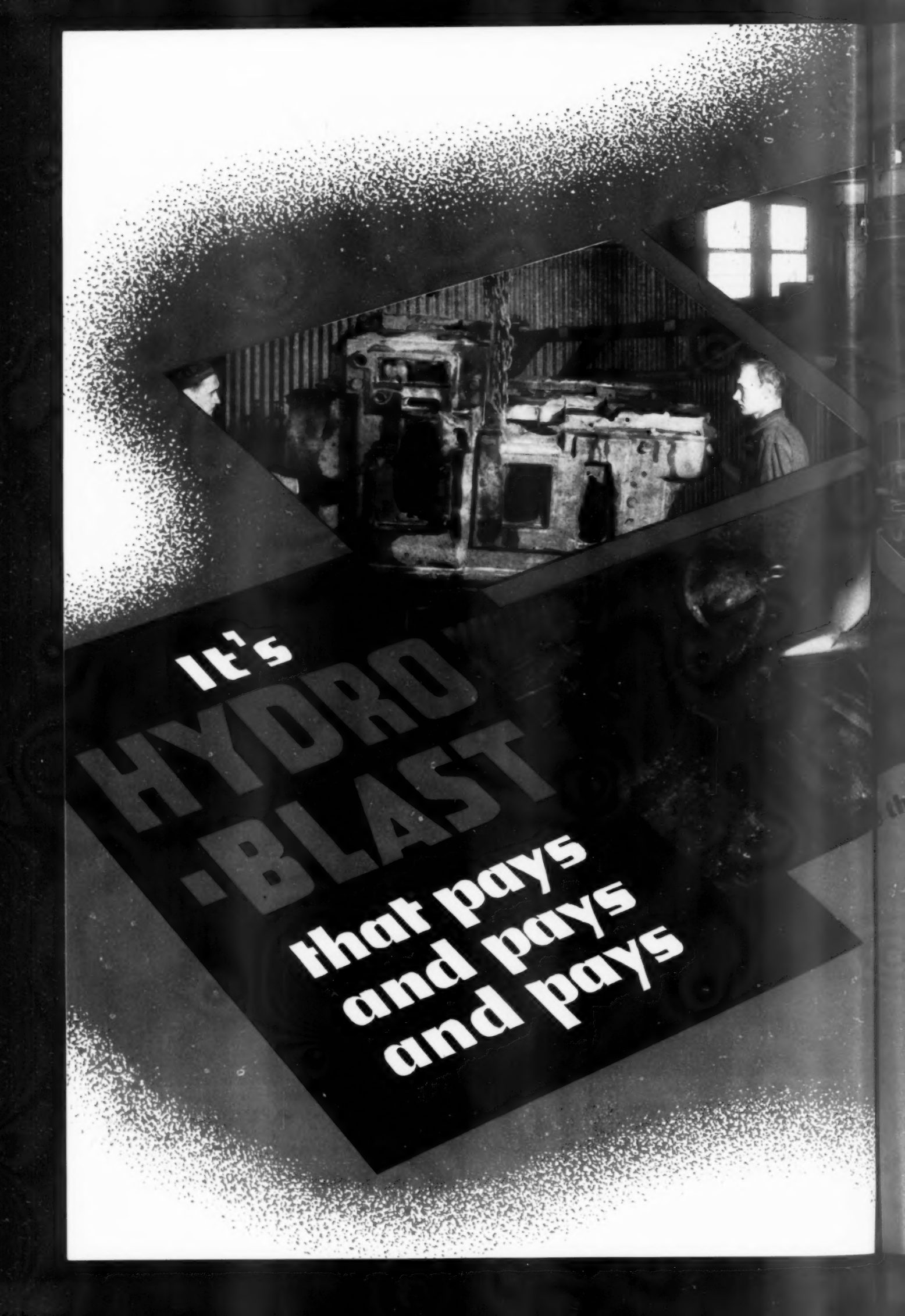
EASTERN CLAY PRODUCTS, INC., EIFORT, OHIO

DIXIE BOND · BLACK HILLS BENTONITE · REVIVO BOND · REVIVO SUPER BOND · BALANCED REVIVO

ECP

All TYPES OF BONDING CLAYS

A Foundry Sand Service Based Upon Practical Research


It's
HYDRO
-BLAST
that pays
and pays
and pays

than 50 foundries are receiving 4-fold dividends from their investment in the Hydro-Blast Method

Hydro-Blast users, by recovering 85 percent of the sand input by weight, are reducing their former freight car, barge and dump truck requirements by more than 75 percent. The recovery of the formerly wasted sand at less than 75 cents per ton, including labor, power, water and maintenance, more than pays for the Hydro-Blast Method during the first year of operation and releases many millions of transport ton miles for greatly needed war materials. Two unskilled laborers and a Hydro-Blast clean the castings better and knock out cores faster than ten chippers. Hydro-Blast mines out the hardest and most complex cores, performs the former chipping operations, cleans surfaces to microscopic cleanliness, and recovers waste sand—all without the creation of dust.

Now is the time to bring your casting cleaning and sand recovery operations up-to-date. Hydro-Blast engineers are available for discussion of today's war production and tomorrow's competition.

THE HYDRO-BLAST CORPORATION

2550 N. WESTERN AVE., CHICAGO, ILL.

How Do YOU Dry BIG Molds?

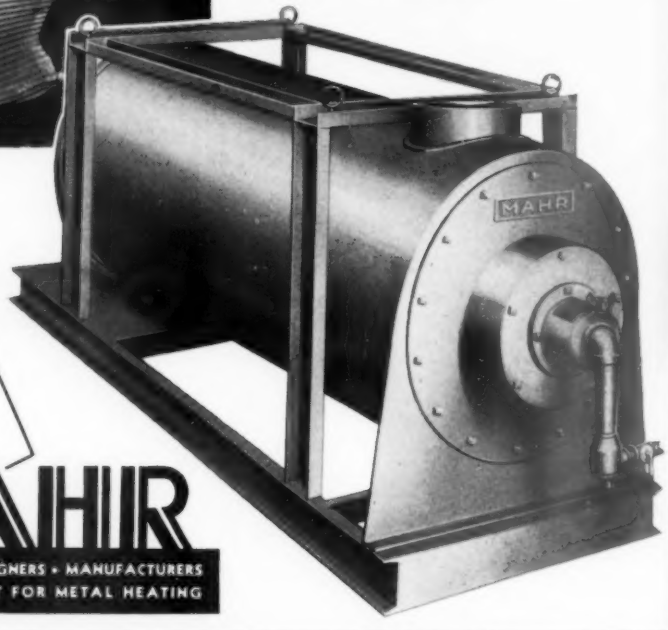
Here's How One Foundry Cut Drying Time from 45 — 50 Hours to 18!

This huge mold will make a 20,000 lb. casting for a marine motor base. If dried in an oven in the usual way, it would take 45 to 50 hours. With two MAHR Portable Mold Dryers on the job, as shown in illustration at left, the mold was ready for pouring in only 18 hours! That's a big step toward "beating the promise" on delivery—and a real saving in Man Hours.

ANOTHER FOUNDRY SAYS...

LYNCHBURG FOUNDRY CO.
Lynchburg, Va.

"We are using the MAHR Portable Mold Dryer in drying the mold of low pressure cylinder castings, which castings are ultimately used on our Victory ships. Our old method of drying these molds was to put the entire mold on an oven car, put the car in the oven and dry the mold from 36 to 48 hours. With the mold dryer we are able to leave the molds on the foundry floor and dry them in an average time of 18.2 hours. We like this unit so well that we have ordered another one from you which we are very anxious to receive."



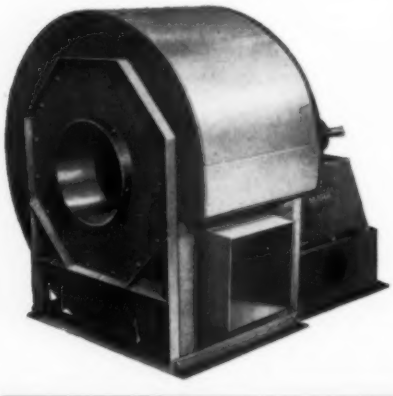
MAHR
ENGINEERS • DESIGNERS • MANUFACTURERS
ALL EQUIPMENT FOR METAL HEATING

OIL OR GAS FIRED Portable MOLD DRYER

There are many reasons for the sensational performance of this modern MAHR unit. It dries from the inside out, —the sand is baked only to the depth needed from the core. All the sand does not have to be baked through from the outside in. Shake-out is easy, and sand does not necessarily have to be reconditioned after each casting.

Heat-up time is extremely fast. Large volumes of hot gases are forced into every part of the mold for fast, complete drying. Normal drying times are radically shortened.

The entire unit is mounted on a heavy channel steel frame, and can be quickly moved and set up for use on any large mold. Fuel may be either gas or oil. Economy in operation is one of its features because of rapid and complete combustion. Made in 4 sizes—250,000—500,000—750,000—1,250,000 BTU capacity.



MAHR Temperature Fans

When your recirculating fans on core ovens, heat treating furnaces and other high temperature applications "pass out" on you long before they should—perhaps you get a little hot yourself and say,—"Why doesn't somebody build a fan to stand up to this kind of work?" That's EXACTLY what MAHR has done! MAHR Temperature Fans were designed and built for recirculating hot gases in our own heating treating furnaces—and for that purpose only. No adapting or remodeling, but a rugged, efficient, high temperature fan for work from 800° F. to 1500° F.—and it really does a job! Many exclusive features. 10 sizes, 800 to 40,000 cfm.

WRITE FOR BULLETINS—on MAHR Portable Mold Dryer—Bulletin 1050. On MAHR Temperature Fans—Bulletin 1070. Or get the whole story from any MAHR representative.

Sales Offices in Principal Cities

MAHR MANUFACTURING CO.
DIVISION OF DIAMOND IRON WORKS, INC.
1709 NORTH SECOND ST. **MINNEAPOLIS, MINN.**

A WORTHY PRODUCT

DE·SUL·FLUX

THE GRANULAR DESULPHURIZING FLUX

IN A GREAT LINE

The Great Lakes Line

•

Juniata Bank Sands
Watrousville Bank Sands
Wilmot Bank Sands
Lake Cicott Bank Sands
Bond Blended Molding Sands
Lake Core Sands
Diamond Blast Sand
Flint Shot Blast Sand
Ottawa Silica Sands (Dried)
Crude Silica Sands (Steel)
Gold Jacket Blast Sand
Ohio Quartz Blast Sand
Globe Shot & Grit
Volclay Bentonite
Southern Bentonite
Lawco Bonding Clay
Refracto Fire Clays
Firestone (Sawed & Rough)
Firebrick (Ohio & Indiana)
Mica Schist—Grits
Firegan
A. B. C. Foundry Coke
Limestone—Fluorspar

DE-SUL-FLUX

Borium & Iron Nozzles
Mill Stars

DE-SUL-FLUX is an alkaline compound in a new quick melting granular form for desulphurizing and refining metal in the ladle. It is being regularly supplied by GREAT LAKES in continuing endeavor to aid foundrymen in making better castings at lower costs.

DE-SUL-FLUX enables foundrymen to use raw materials of higher sulphur content by increasing the percentage of scrap and still stay well within the mixture limit for sulphur. Foundries are showing substantial savings in metal costs and maintain or improve quality of castings by the use of DE-SUL-FLUX.

By the action of DE-SUL-FLUX in refining grain structure and eliminating non-metallic inclusions, the metal is appreciably improved and sounder castings are assured.

The price of DE-SUL-FLUX remains unusually low. It comes in handy, free-flowing, dustless, granular form that is easy to measure out—packed in 100 pound bags and bulk carlots.

CHECK RESULTS FROM A BAG OR A TON!

De-Sul-Flux is a product of the
WYANDOTTE CHEMICALS CORPORATION
Sold and Serviced by

Great Lakes Foundry Sand Co.

UNITED ARTISTS BLDG. DETROIT, MICHIGAN

MINERS — PROCESSORS — FOUNDRY, METALLURGICAL AND SAND BLAST SERVICE

For High Achievement In War Production

The men and women of William F. Jobbins, Incorporated, thank you, Mr. Patterson, Under Secretary of War, for bestowing this honor upon us.

We see in this more than an Award for past achievements and increased effort. ALL OF US, therefore, pledge our full effort to support with our labor and skill the men who fight OUR war so that we may — keep the "E" Flag flying and . . . dedicate our entire knowledge and facilities to complete and final victory.

America is proud of the entire Aluminum Industry. It recognizes its accomplishments as amongst the greatest industrial achievements of the war.

WILLIAM F. JOBBINS, Incorporated

in the past two years, through a self-financed expansion program, has increased its operations by 500%. Before the end of 1943, the Secondary Aluminum Industry in the United States will have an annual production of over one-half billion pounds of Secondary Aluminum or about four times pre-war capacity.

Every employee receives this emblem to wear as a sign of distinguished service to his country.

WILLIAM F. JOBBINS, Incorporated

SMELTERS AND REFINERS, SECONDARY ALUMINUM

AURORA, ILL.

FOR ALL USES!

CITIES SERVICE FOUNDRY PRODUCTS

CITIES SERVICE OILS

CORES Manufactured by LIBERTY FOUNDRY DIVISION, GREDE FOUNDRIES, INC., MILWAUKEE, WIS.

AGAIN, in War as in Peace, Service to a Nation, Cities Service Oil Company and their staff of engineers are at the service of vital production plants of the nation. The products manufactured for foundry work by Cities Service insure service, quality and maximum dependability. Cities Service carries a complete stock at hundreds of distribution points throughout the territories shown below.

★

A LARGE MIDWESTERN MANUFACTURER OF VALVES

W. I. HARSHBARGER and JOHN PLEVA, HANSELL-ELCOCK FOUNDRIES, CHICAGO, ILL.

R. C. HARDIE, CITIES SERVICE ENGINEER, C. NIMMER and J. R. BIRD, LIBERTY FOUNDRY DIVISION, GREDE FOUNDRIES, INC., MILWAUKEE, WIS.

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E-ALWAYS

ITIES SERVICE OIL COMPANY

OFFICES IN CHICAGO, CLEVELAND, DETROIT, ST. PAUL, CEDAR RAPIDS, TULSA, KANSAS CITY, FORT WORTH, SHREVEPORT, MILWAUKEE, TORONTO, NEW YORK

Use the Right Type of Grinding Wheel
. . and the Right Grain and Grade

STRAIGHT WHEELS

Nearly all portable grinders today are of the high speed type (9500 s.f.p.m. maximum) and there are Norton Wheels in the correct sizes for all makes—electric, air or flexible shaft driven. For straight wheels the most common specifications are:

CASTINGS

Steel and Annealed Malleable Iron, 24-P4T Res.; Gray Iron, 3716-Q4T-H Res.; Brass and Bronze, 3724-Q4T-H Res. # 12 Treated; Stainless Steel 1/2" thick wheels, 36-P4T; 1" and thicker wheels, 24-P4T Res.

CONE WHEELS

For grinding small radii and the many hard-to-get-at places on castings and welded work, as well as for countless odd jobs around the plant, Norton cone wheels are the handy answer. They are available in a wide variety of standard sizes in both the curved and straight sided styles—also in the rectangular shapes known as plug wheels. Common specifications are:

CASTINGS

Steel, 24-Q4T-L; Gray Iron, 3724-R4T-H.

CUP WHEELS

For countless operations, especially large flat surfaces on castings and many weld grinding jobs, cup wheels are the preference. They are available in both the straight and flaring types and with a plain babbitt bushing or a threaded steel bushing. Common specifications are:

CASTINGS

Steel and Annealed Malleable Iron, 16-P4T Res.; Gray Iron, 3716-P4T Res.; Brass and Bronze, 3724-Q4T-H Res. # 12 Treated; Stainless Steel, 16-P4T Res.

NORTON COMPANY
Worcester, Mass.
W-917

NORTON ABRASIVES

This advertisement is one of a series appearing regularly in national periodicals, farm publications and prominent city newspapers. Reprints in color are available for your use. Write us for them.

From a full-color painting by Peter Helck for Republic Steel.

BELLY FULL OF BULLETS—but every man alive!

Tex., reported not one man of the 10 aboard the bomber received as much as a scratch. One of the bomber's engines was shot up, however, and there were bullet holes in the fuselage. It was this bomber's first encounter with Jap Zeros. The plane crew included ...

(clipped from a recent issue of the Cleveland Plain Dealer)

Unusual news? Once it was, but not today! Items like this are appearing almost every day—telling of the miraculous ability of American bombers to reach their objectives through a deadly hail of enemy fire—and return with every man alive.

★ ★ ★

American planes are proving their fighting ability in the skies over most of the globe. They can take it as well as dish it out.

Scores of American flyers in all parts of the world owe their lives to armor plate at vital points in planes—armor plate *tough* enough to stop enemy bullets and *light enough to fly* high.

The quality of these planes is a tribute to the American system of industry. The volume of their production is amazing—from 20,000 in 1941 up to 49,000 in 1942—more planes than we produced in the 23 years preceding this war.

This production job would not have been possible without vastly increased tonnages of the fine steels necessary for engines, fuselages, propellers, landing gear, armor and armament.

Free American industry has done a far greater war production job in two years than Hitler's "efficient dictatorship" could do in *ten* years! And not because we are a race of supermen, but because we are *FREE* men.

In these same two years, Republic's electric furnace capacity for making "Aircraft Quality" steels, light armor plate and other fine alloy steels increased more than 700%. Output of steel plates for ships was boosted 500%. A huge stream of peacetime products was diverted into a record-breaking flood of war steels and steel products.

Until we win the victory that will insure our American way of life—freedom to live as we choose, to speak, worship and work without fear or want—Republic will continue its "full-out" war effort.

After that, Republic will utilize its past experience, enlarged facilities and new knowledge gained in wartime production and in increasing research to provide more steel, finer steels to further enhance what we have always thought was the best Country in which to live.

You and we owe it to our sons and brothers in uniform that they shall return to an America that is worth their sacrifices—an America that will grow even greater and stronger because it is *FREE.* Let's see to it that our job is done—*WELL!*

REPUBLIC STEEL CORPORATION

General Offices: Cleveland, Ohio

Berger Manufacturing Division • Culvert Division
Niles Steel Products Division • Steel and Tubes Division
Union Drawn Steel Division • Truscon Steel Company
Export Department: Chrysler Building, New York, N. Y.

Republic

PIG IRON ("CHATEAUGAY" • "REPUBLIC" • "PIONEER")

Truscon Foundry Flasks—Republic Core Wire—Foundry Nails

WHITING
Makes this Equipment for Foundries

●

Wet Type Spark Suppressors

Cupola Blowers and Accessories

Hot Blast Systems

Moisture Control Systems

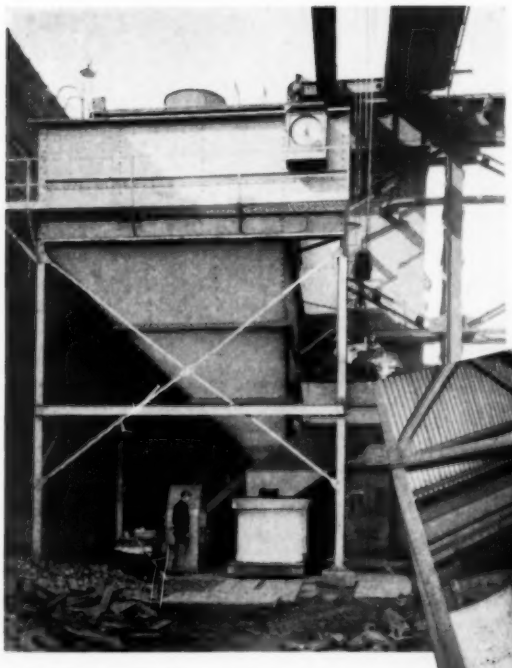
Hydro-Blast Barrels

Sand Dryers

Hydro-Clone Dust Suppressors

Air Furnaces

Pulverized Coal Firing Equipment



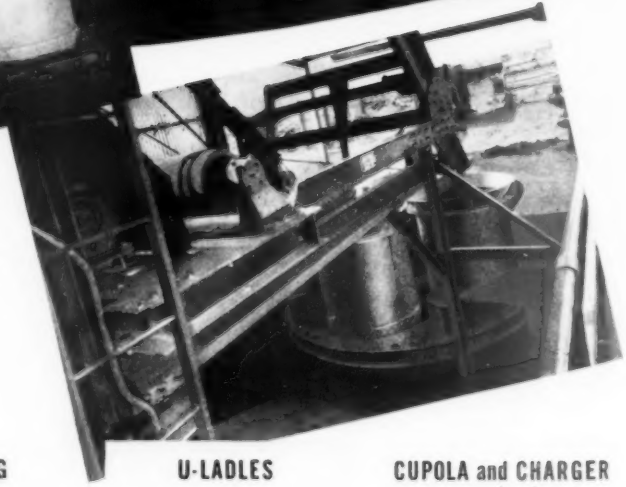
Showing coke and stone bins . . . also yard crane with magnet.

Charging buckets being filled and weighed.

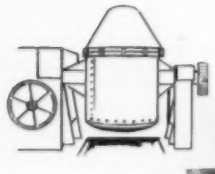
MECHANICAL CHARGING . . . saves in large and

Filled buckets move on motor-driven transfer cars.

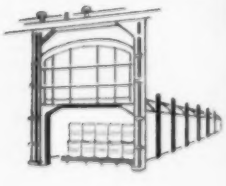
Turntable, used in loading buckets.



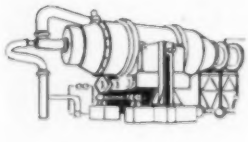
CONVERTERS



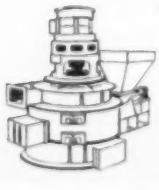
ANNEALING OVENS



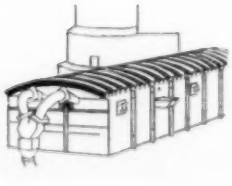
ROTARY FURNACES



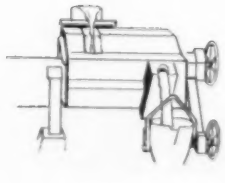
PULVERIZERS



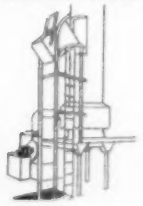
DUPLEXING



U-LADLES



CUPOLA and CHARGER



manpower small foundries

Whiting Wishbone Charging Crane, underslung type.

Cupola charging that formerly required five or six men working by hand is now being done with only two men using Whiting Mechanical Charging Equipment. Materials proceed promptly from yard to cupola, and casting production is improved in quality.

Specially engineered Whiting Mechanical Charging Equipment is adaptable to every kind of operating condition. Write for information. Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

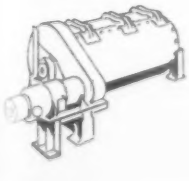
Recently revised booklet of "Practical Hints on Cupola Operation" is available to users of Whiting Cupolas.

WHITING CORPORATION

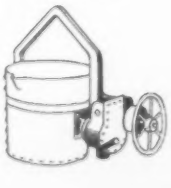
Whiting Vertical Skip Hoist Charger.

ARMY E NAVY

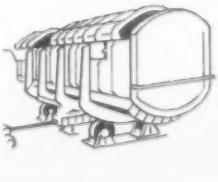
TUMBLERS



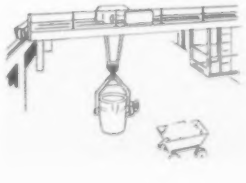
LADLES



CRADLE FURNACES



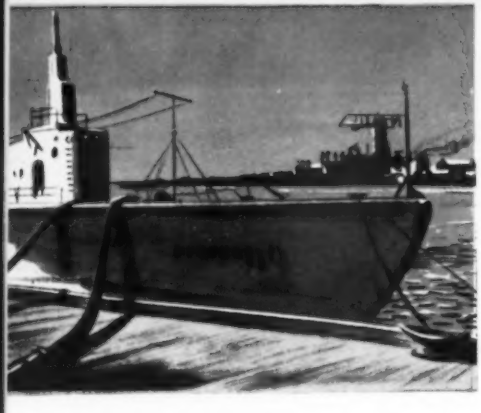
CRANES



MANHATTAN

Abrasive Wheels

CUSTOM-ENGINEERED TO YOUR WAR PRODUCTION WORK



The ultra close tolerances so essential for aircraft instruments and control devices are possible only because of modern grinding equipment. Grinding wheels speed up almost every type of war production, aloft, at sea or on land.

TO THIS frequent and true statement that, "This is a machine tool war," may be added, "It's also an abrasive war, a rubber war and a war of synthetics."

Abrasives are performing speed-up functions at thousands of places in the most colossal, varied and astounding production program the world has ever seen.

But abrasive particles carefully graded for size and with many different cutting characteristics must be so bonded together that they withstand wear and remove metal quickly, smoothly and effectively. Bonding with rubber and synthetic compounds has made it possible to meet these simple-sounding but exacting specifications—specifications that are different for every metal or alloy, for every task, if cutting is to be done in the minimum of time.

MANHATTAN Abrasive Wheels—custom-engineered to large production—are used on the "thousand fronts of Industry" to snag and rough-grind castings and billets; to smooth off welding burs; for centerless grinding; for high-speed cutting-off; to grind tools, to cut stone and do other operations in the efficient removal of materials.

50 YEARS OF RESEARCH

The half-century milestone MANHATTAN is a dual marker continued progress and for cause of that progress and unf ging research. It is this which yielded the long succession of vances and developments of wh a few notable examples are: Vib tion Dampened Portable Grind Wheels, Resilient Grinding Whe Compensated Power Transmiss Belting, in which all plies h equal stresses; and the Homo hose construction principle wh increases the flexibility and lif rubber hose.

There are many others. Some old friends to industry; oth restricted to war needs, will eme from military use to help the p war resurgence of industry.

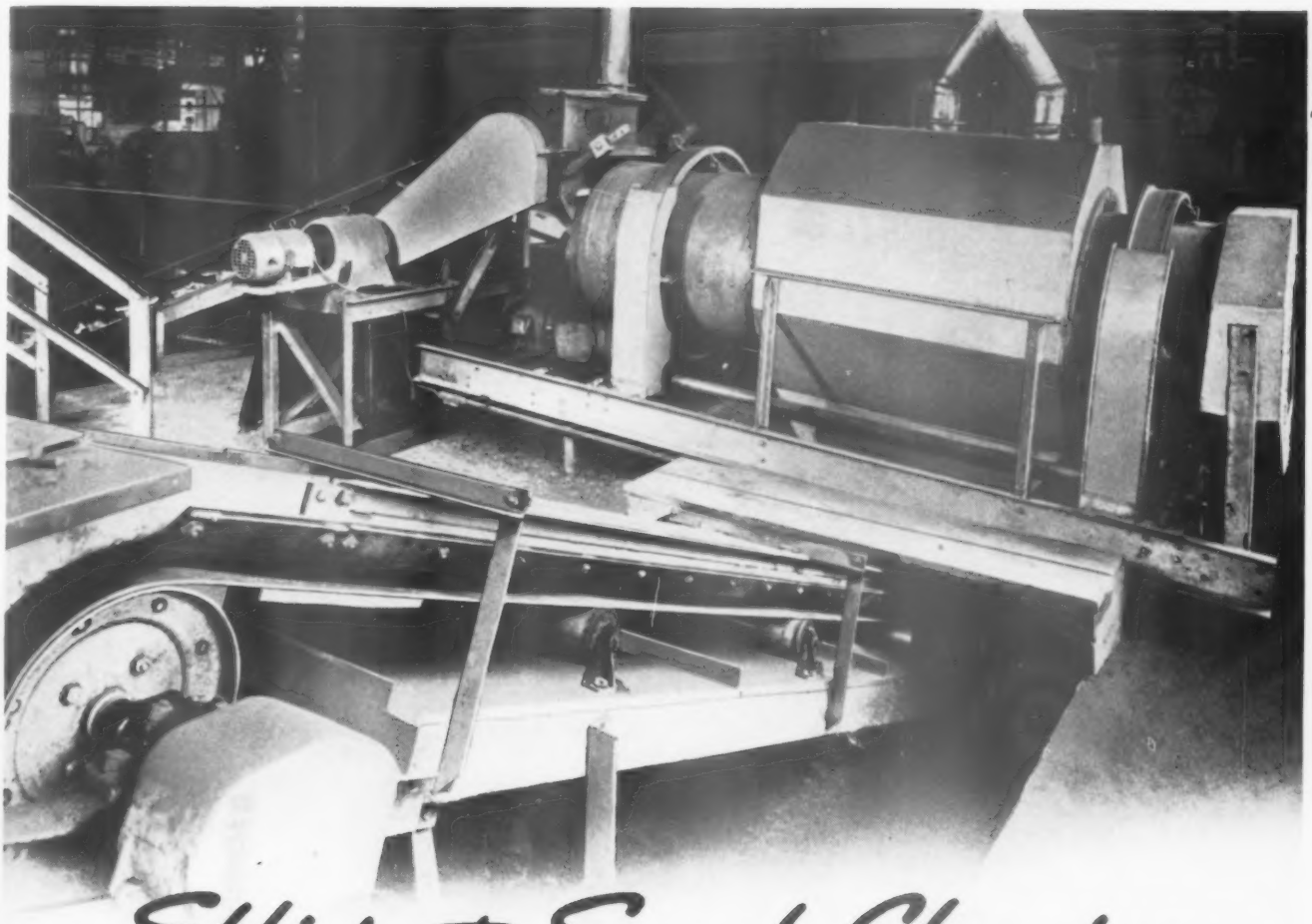
If you are looking for ways to speed cutting or grinding time, consult MANHATTAN's

ABRASIVE WHEEL DEPARTMENT

THROW YOUR SCRAP INTO THE SCRAP!

KEEP AHEAD WITH MANHATTAN

THE MANHATTAN RUBBER MANUFACTURING DIVISIO
of RAYBESTOS-MANHATTAN, INC.
EXECUTIVE OFFICES PASSAIC, NEW JER



Efficient Sand Cleaning
is important in small foundries too!

● Fully housed in and vented to a dust collector, this revolving breaker screen in a small steel foundry, cleans up to 30 tons of sand per hour, with almost no dust loss at all. Flights, on the inside of the unhooded breaker section, lift the sand and drop it down on a solid plate, breaking up the lumps, before the sand passes to the wire mesh screening section. Sprues, gaggers, rods and hard-baked lumps are discharged at the end.

Bartlett-Snow Revolving Breaker Screens can handle dry, hot, cold or any intermediate condition of sand,—range from 30″ to 84″ in diameter. They meet all requirements for on-the-floor or overhead mounting — and are installed usually with magnetic pulleys which are placed either before or after the screen, depending upon conditions.

Our recently issued 40-page Bulletin No. 91 which illustrates many different arrangements of revolving and vibrating screens,—and other Bartlett-Snow Foundry Equipment—will be of great interest to every foundryman. Send for a copy!

THE C. O. BARTLETT & SNOW CO.

6201 HARVARD AVENUE • CLEVELAND, OHIO

Engineering and Sales Representatives in the Principal Cities

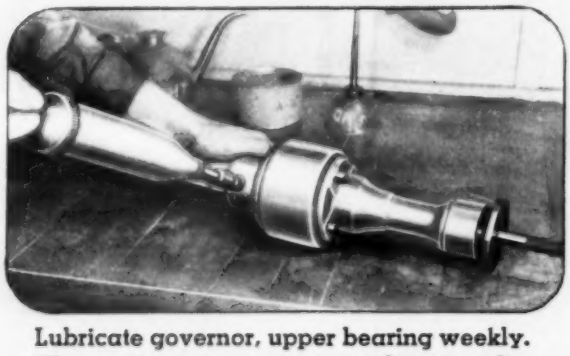
FOUNDRY SAND, MOLD AND CASTINGS HANDLING • • DUST AND FUME CONTROL SYSTEMS • •

Pneumatic Grinders Get Gruelling Service

—PREVENTIVE MAINTENANCE IS IMPORTANT

In shipyards, steel mills, foundries and other industries, CP Pneumatic Grinders are getting tough usage, and practically continuous service. Like any well-built tools, they deserve simple, preventive care. Grease and oil them at regular intervals . . . keep nuts tight . . . clean air strainers . . . blow air lines free of moisture and dirt. If these simple precautions are taken regularly, CP Pneumatic Grinder maintenance will be kept to a minimum.

HOW TO GET MAXIMUM SERVICE FROM CP PNEUMATIC GRINDERS



Lubricate governor, upper bearing weekly. Clean out, renew grease every three months.

Grease the spindle bearing weekly. Clean out and renew grease every three months.

On each shift, fill the oil reservoir with 200 viscosity oil to lubricate the motor.

Check all nuts — on all portable tools — at regular intervals. Be sure they are tight.

★★★★★★★★★
PNEUMATIC TOOLS
ELECTRIC TOOLS
(Hicycle...Universal)
ROCK DRILLS

CHICAGO PNEUMATIC
TOOL CP COMPANY
General Offices: 8 East 44th Street, New York, N. Y.

★★★★★★★★★
AIR COMPRESSORS
VACUUM PUMPS
DIESEL ENGINES
AVIATION ACCESSORIES

THESE BULLETINS WILL HELP YOU

Write for copies!

OTHER RECENT BULLETINS

which will be freely sent to practical foundrymen on request are:

No.	TITLE
S-1	—Advantages of Synthetic Sands Over Natural Molding Sands.
S-2	—Selection of the Base Sand.
S-3	—Blending Molding Sand Bonds.
S-4	—Molding Sand Practice for Magnesium Foundries.
S-5	—Volclay in Steel Foundry Sands.
S-6	—Volclay and Panther Creek in Malleable.
S-7	—Malleable Sand Formulas.
S-8	—Use of Volclay Bentonite in the Gray Iron Foundry.
S-9	—Gray Iron Formulas.
S-10	—Panther Creek Bentonite Sand Formulas for Gray Iron.
S-11	—Volclay and Panther Creek Bentonites in Cores.

Bulletin No. 223-C

16 pages of up-to-date information

CONTENTS

Progressive Changes in Foundry Molds Due to Heating and Subsequent Cooling.

Heat Transference into Molds, showing charts, graphs and photos of specimens.

Synthetic Sand Mixtures, with Six Different Bonds.

Sintering.

Why do Western and Southern Bentonite differ?

Which Type of Bentonite for Foundry Work?

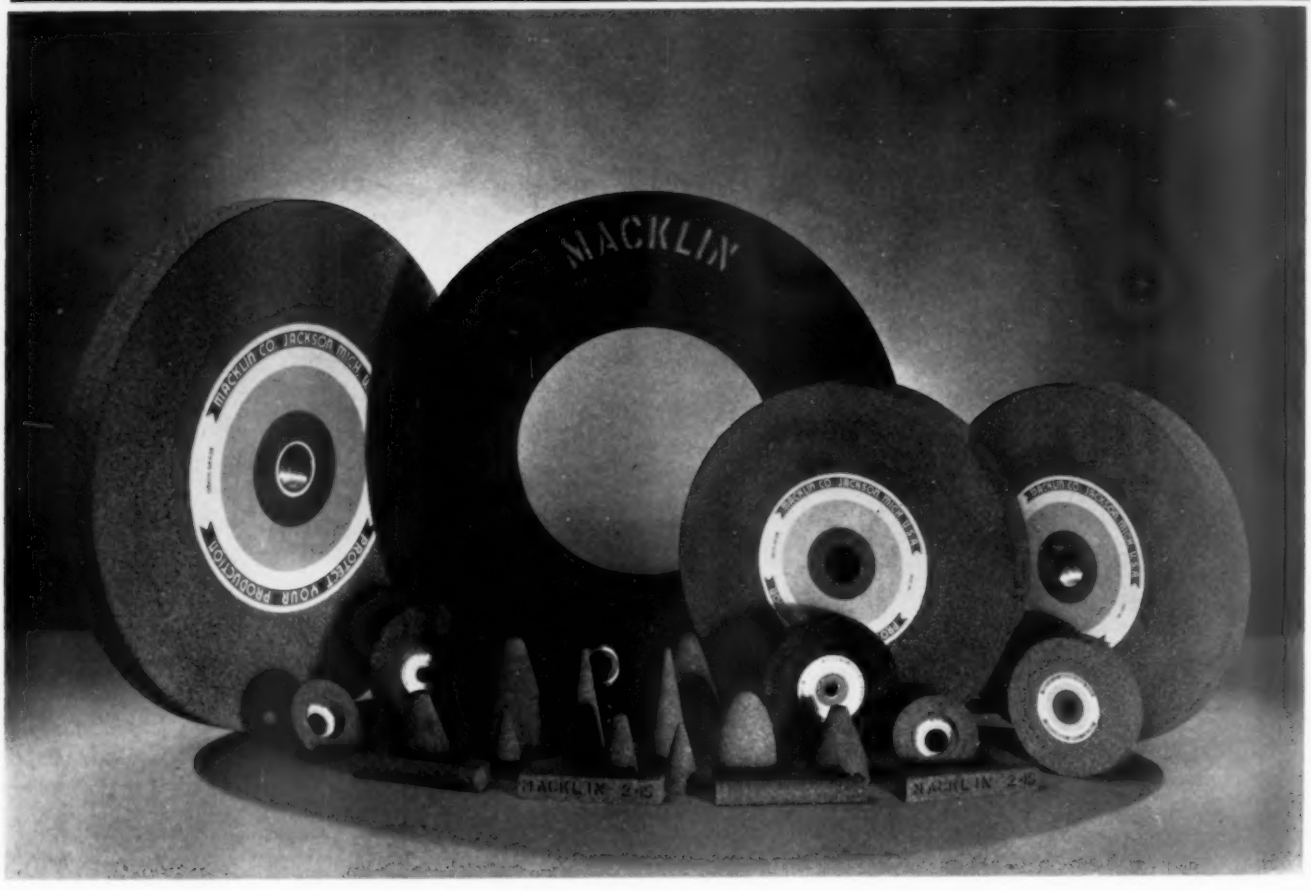
Panther Creek
SOUTHERN BENTONITE
Combining the highest Green Strength with low Dry Strength.

Volclay
WESTERN BENTONITE
Strongly entrenched by 15 years of success in foundry work.

AMERICAN COLLOID COMPANY

363 WEST SUPERIOR STREET • CHICAGO, ILLINOIS

MACKLIN
Grinding Wheels



FOUNDRIES, large and small, require grinding wheels in many sizes, shape, grains and grade combinations.

Macklin Company is thoroughly equipped to produce high quality grinding wheels for all foundry requirements.

No matter what your grinding problems may be there is a Macklin wheel to fit the job that will "Protect Your Production."

Ask for the services of a Macklin Field Engineer.

Invest in War Bonds

MACKLIN COMPANY

Manufacturers of GRINDING WHEELS—JACKSON, MICHIGAN, U. S. A.
Distributors in all principal cities
***Sales Offices:*—Chicago - New York - Detroit - Pittsburgh - Cleveland - Cincinnati - Milwaukee - Philadelphia**

WHAT AJAX SIGNIFIES

AJAX METAL COMPANY

AJAX NON-FERROUS INGOT METALS: The first program for scientific control of ingot metal production was set up in and by the Ajax Metal Company 45 years ago. The result continues to be a sense of sureness and ...ction in all the dealings of foundrymen with this ...any. **Philadelphia, Pa.**

...AX ELECTRIC FURNACE CORP.

Division of Ajax Metal Co.

AJAX-WYATT INDUCTION MELTING FURNACES: Virtually all the brass mills in North America use these furnaces because they have the lowest metal losses in the field—less than 1%—with superior temperature ...ontrol and unapproached economy of operation on ...igh production schedules such as we have today. **Philadelphia, Pa.**

AJAX ELECTROTHERMIC CORP.

Division of Ajax Metal Co.

HIGH-FREQUENCY MELTING AND HEATING: Development of high frequency melting and induction heating as early as 1916 represents a basic contribution of Ajax research to metallurgical art. Use of Ajax-Northrup units is the trend in melting high alloy tool steels, magnet steels; for centrifugal castings; and heating for hot-forming. **Trenton, N. J.**

AJAX ELECTRIC CO., INC.

Division of Ajax Metal Co.

AJAX-HULTGREN SALT BATH FURNACES: Over a thousand of these furnaces have been installed. For practically every heat-treating operation from 300° F. to 2400° F., the Ajax-Hultgren Electric Salt Bath Furnace has definitely proved its advantages and received the acclaim of leading metallurgists throughout the world. **Philadelphia, Pa.**

AJAX ENGINEERING CORP.

Division of Ajax Metal Co.

ALUMINUM MELTING FURNACES: Advantages inherent in the original Ajax-Wyatt low-frequency melting principle and design are found in the Ajax-Tama-Wyatt furnace, incorporating original and specific features for aluminum melting, permitting production of homogeneous alloys with diminished oxidization and no danger of overheating or underheating. **Trenton, N. J.**

SINCE 1880

INSURE a Steady Rapid Flow of MATERIALS . . . . . .

● Moving materials and supplies into the plant — getting them to production lines when and where needed — moving them through manufacturing processes — transporting finished goods away from production lines to storage or shipping — making full use of available space for stacking . . . all of these are requirements in production that can be accomplished FASTER — EASIER — SAFER — MORE ECONOMICALLY through "AUTOMATIC" transportation.

Mechanized handling is right in step today with your most advanced processes — "AUTOMATICS" offer you a quick and dependable answer to your materials handling. Ask an "AUTOMATIC" representative.

★ Model THTF-L—Telescopic and tilting, center-control fork trucks, capacities from 3000 lb. to 8000 lb., for unit loads on pallets or skid platforms.

★ Model THTF-M — Heavy Duty, telescopic and tilting center-control fork truck, 8000 lb. and 10,000 lb. capacity, for unit loads on pallets or skid platforms.

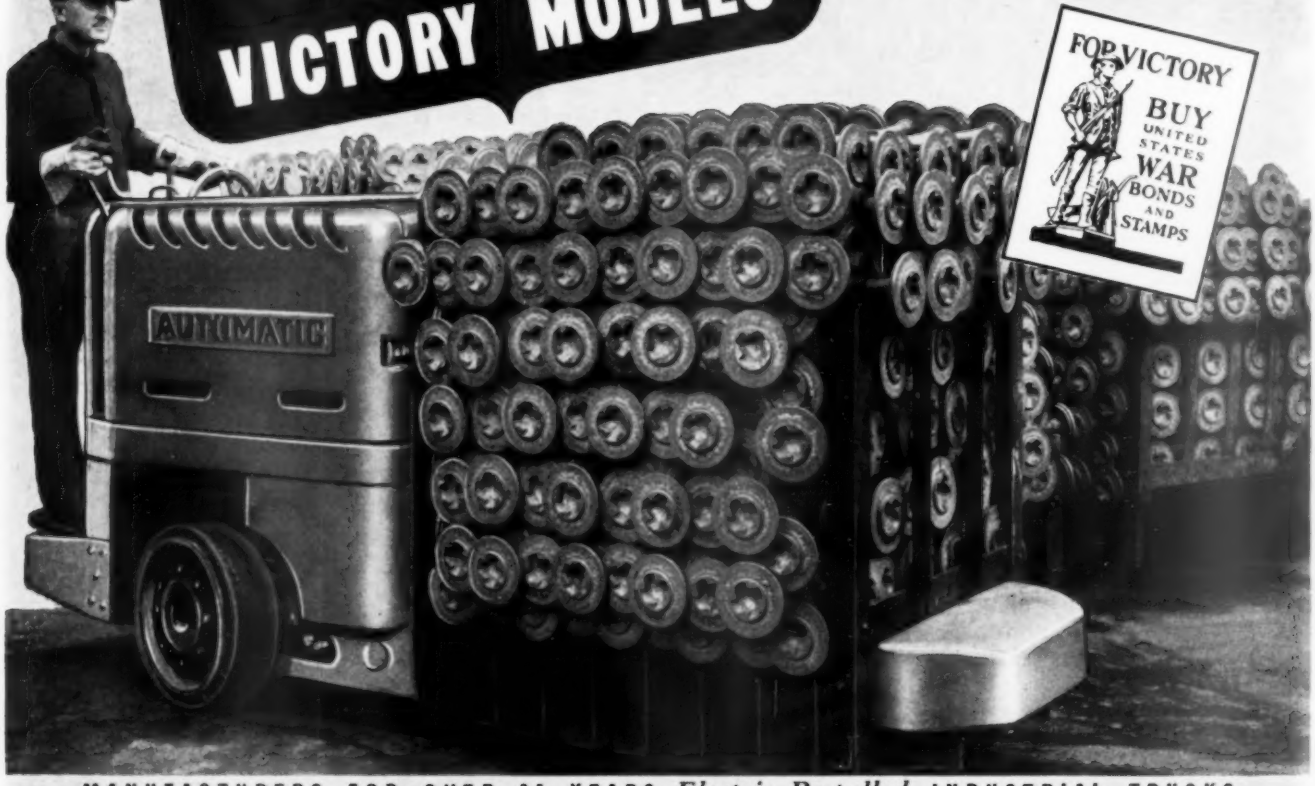
★ Model CHTF-2 — Light duty, telescopic and tilting center-control fork truck, 2000 lb. capacity, for unit loads on pallets or skid platforms.

★ High lift tiering platform trucks, capacities 4000 lb., 6000 lb. and 10,000 lb., for skid transportation and stacking.

★ Low - lift elevating platform trucks, capacities 4000 lb., 6000 lb. and 10,000 lb., for skid transportation.

★ "Transporter" power driven lift trucks, platform type, 4000 lb. and 6000 lb. capacities, for skid transportation, and fork type, 4000 lb. capacity, for unit loads on open or double faced pallets.

TRADE AUTOMATIC MARK
Standard
VICTORY MODELS



MANUFACTURERS FOR OVER 35 YEARS *Electric Propelled* INDUSTRIAL TRUCKS

AUTOMATIC TRANSPORTATION CO.

DIV. OF THE YALE & TOWNE MFG. CO.

121 WEST 87th STREET CHICAGO, ILLINOIS

LOGISTICS is the word for the exact military science of supply and delivery. Upon the speed and facility with which this branch of the service can function depends the eventual outcome of the war. On the factory front, too, adequate supply and delivery of raw materials are just as vital.

And that is where Federated Metals steps in. With its geographically strategic plants and distributional centers adjacent to or an integral part of every important manufacturing center, Federated is equipped and keyed to fill wartime's demands for non-ferrous metals of dependable quality.

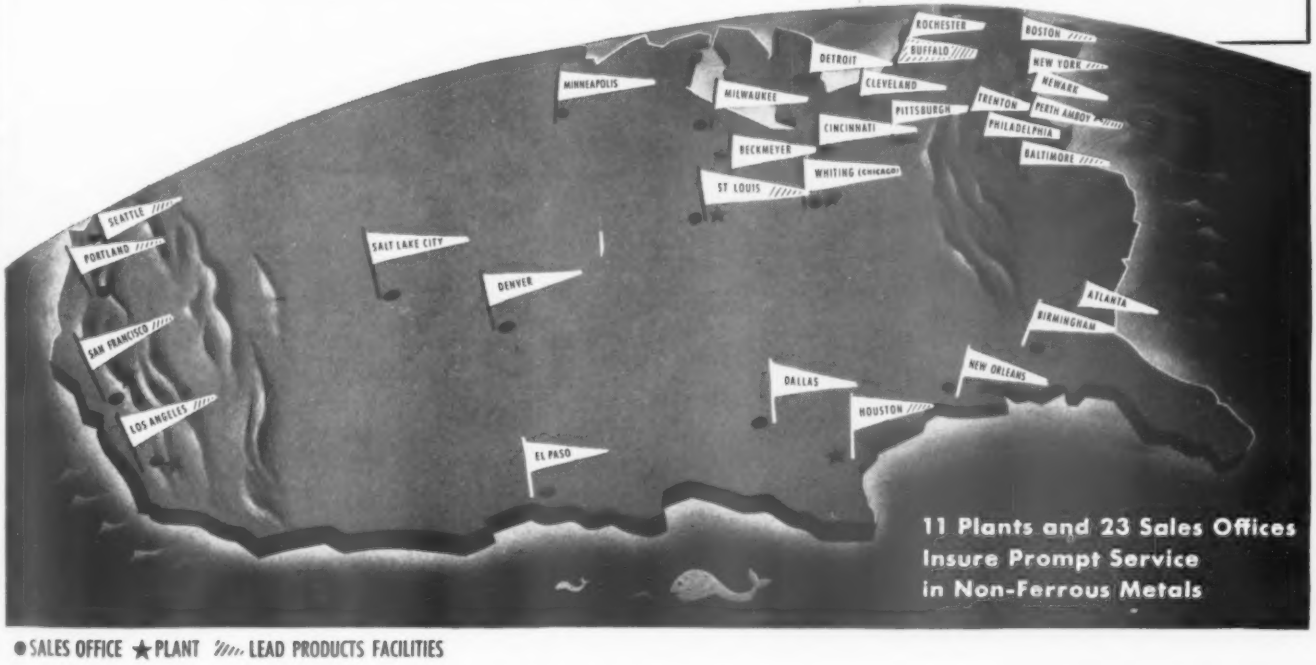
Today, Federated's traditional skill, research and manufacturing facilities are devoted – 24 hours around the clock – to the production of more and more perfect ingots for the needs of industry. Tomorrow, these better metals will be available to help you meet the post-war battle of competition. *For information, contact your nearest Federated Sales Office.*

Logistics
is another word for
SERVICE!

PRODUCTS PRODUCED BY FEDERATED METALS

ALUMINUM	SOLDER
BRASS	BABBITT
BRONZE	TYPE METAL
ZINC	LEAD

All of these in all commercial forms – Special Alloys to your specifications.



●SALES OFFICE ★PLANT ⁄⁄⁄ LEAD PRODUCTS FACILITIES

FEDERATED METALS DIVISION
AMERICAN SMELTING AND REFINING COMPANY

SALES OFFICES
ATLANTA, GA.
BALTIMORE, MD.
BIRMINGHAM, ALA.
BOSTON, MASS.
CINCINNATI, OHIO
CLEVELAND, OHIO
DALLAS, TEXAS
DENVER, COLO.
DETROIT, MICH.
LOS ANGELES, CAL.
MILWAUKEE, WIS.
MINNEAPOLIS, MINN.
NEW ORLEANS, LA.
NEW YORK CITY
PHILADELPHIA, PA.
PITTSBURGH, PA.
PORTLAND, ORE.
ROCHESTER, N. Y.
SALTLAKECITY, UTAH
ST. LOUIS, MO.
SAN FRANCISCO, CAL.
SEATTLE, WASH.
WHITING, IND. (Chicago)

PLANTS
BECKMEYER, ILL.
DETROIT, MICH.
HOUSTON, TEXAS
LOS ANGELES, CAL.
NEWARK, N. J.
PERTH AMBOY, N. J.
PITTSBURGH, PA.
SAN FRANCISCO, CAL.
ST. LOUIS, MO.
TRENTON, N. J.
WHITING, IND.

FMD
FEDERATED METALS DIVISION
AMERICAN SMELTING AND REFINING COMPANY

AN OUTSTANDING

1. An intricate pattern has been drawn and is being rolled back ready for the next mold. This complicated job is simplified by the precision-smooth operation of this modern "DAVENPORT" Jolt Roll Over Draw molding machine, Model SA, Number 40.

"DAVENPORT" Roll Over machines are operating in steel, malleable and gray iron, magnesium and non-ferrous foundries throughout America, making superior quantity and quality tanks, guns, planes and ship parts.

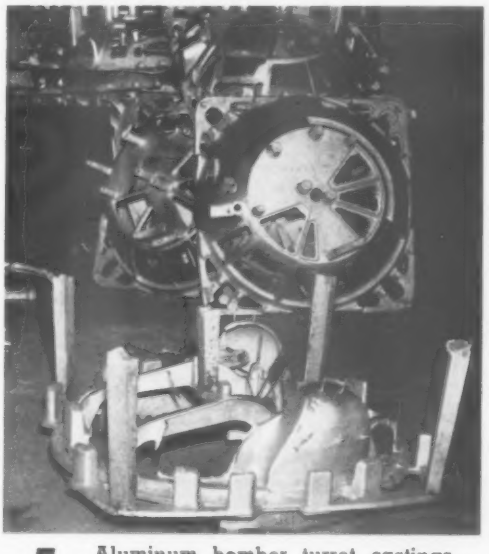
DAVENPORT

ROLL OVER JOB

2. Pattern has been drawn and returned to jolting position. The complete drag mold is shown in foreground.

3. Steady hands set cores in drag mold.

4. The complete drag with cores set ready for cope.



5. Aluminum bomber turret castings before gates and risers have been removed.

PREPARE for PEACE
IN TIME OF WAR

Now is the time that every foundry should be checked for high efficiency. See that your man hours are producing to meet the world competition which will follow this war. The foundries of America will be called upon to produce as never before—new consumer products which will replace worn out and obsolete pre-war necessities.

Send for our complete catalog which illustrates Modern "DAVENPORT" foundry equipment.

"DAVENPORT" LINE OF MOLDING MACHINES

JOLT ROLLOVER DRAW MACHINE
Model SA (7 sizes) Capacity from 750 to 12,000 lbs.
Model A (6 sizes) Capacity 1,000 to 12,000 lbs.

JOLT STRIPPER OR PUSH-OFF MACHINE WITH ADJUSTABLE LIFT PINS
Six sizes—Capacity from 1,000 to 10,000 lbs.

PLAIN JOLT MACHINES
Fourteen sizes—Capacity from 200 to 25,000 lbs.

DAVENPORT MACHINE & FOUNDRY CO.
DAVENPORT IOWA, U. S. A.

MODERN MOLDING MACHINES

DAVENPORT"

B. S. & B.

STEEL FOUNDRY FLASKS

Will speed your production and save Manpower

Proper flask equipment assures more molds per man per day and at the same time results in fewer rejects.

B. S. & B. flasks are in use in foundries everywhere, helping to accomplish these desirable results.

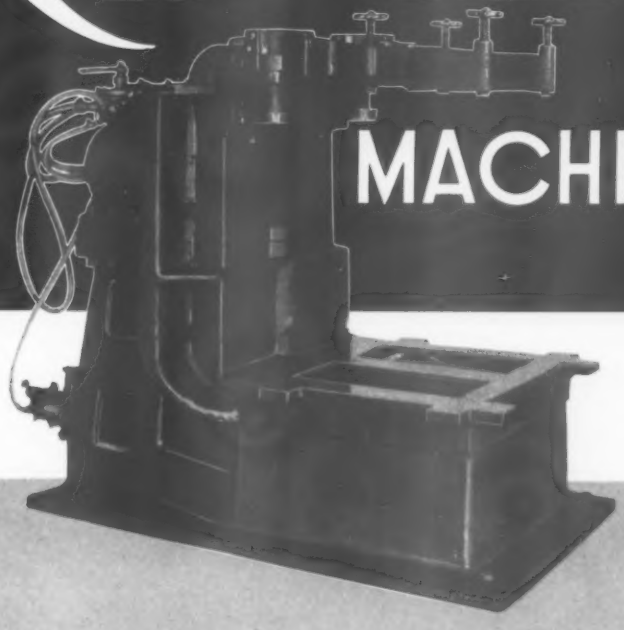
Our authorized representatives are conveniently located. Either they, or the factory office, will be happy to be of assistance.

BLACK-SIVALLS & BRYSON, INC.

7500 E. 10TH ST. *KANSAS CITY, MO.*

GRIMES

MOLDING MACHINES



Our machine illustrated above is the Model K614—1000 lbs. capacity in position to receive pattern plate and flask.

This machine is built entirely above the floor, requiring no expensive pits to build and keep clean. Center of gravity of the mold is the center of rotation.

We engineer and build a complete line of hand and power roll-overs for core room and foundry—ask us about the Model C-414 for magnesium castings production.

Also consult with us about the installation of complete core sand mixing units, incorporating automatic proportioning of ingredients. Wire, phone or write for complete details.

Grimes Molding Machine Co.

1429 VIRGINIA PARK, DETROIT, MICH.

TAM ZIRCONITE PRODUCTS AVAILABLE

TAM
Foundry Zirconite Sand (in three grades)
Melting Points from 3650° F to 3950° F

TAM
Foundry Zirconite Flour (in two grades)
Melting Points from 3650° F to 3812° F

TAM
Foundry Zirconite Mold and Core Washes (in three grades)
Super-refractory compounds with melting points from 3600° F to 3775° F

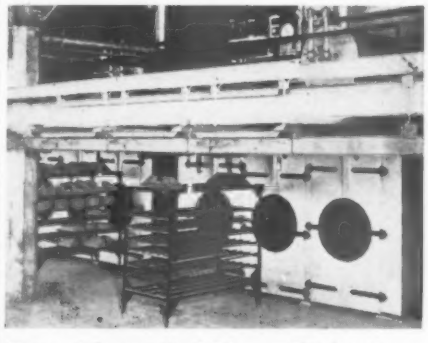
GENERAL OFFICES AND WORKS: NIAGARA FALLS, N. Y., U. S. A.
EXECUTIVE OFFICES: 111 BROADWAY, NEW YORK CITY

Representatives for the Pacific Coast . . . BALFOUR, GUTHRIE & CO., San Francisco, Los Angeles, Portland, Seattle, Tacoma
Representatives for Canada . RAILWAY & POWER ENG. CORP., Ltd., Toronto, Montreal, Hamilton, Winnipeg, Vancouver, Sydney
Representatives for Europe . . . . . T. ROWLANDS & CO., Ltd., 23-27 Broomhall St., Sheffield, England

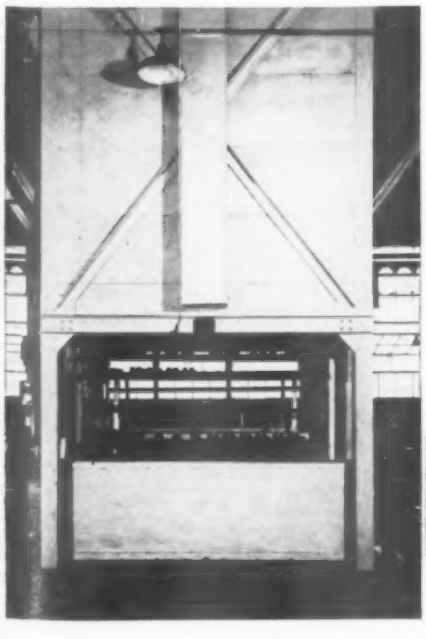
Outstanding SERVICE draws important customers for CARL-MAYER OVENS

Core and mold ovens hold a position of real responsibility. They dictate the speed and character of casting production. It is therefore, a high tribute to Carl-Mayer Ovens to be chosen repeatedly by America's foremost foundries, in face of wide competition.

Consult a Carl-Mayer Engineer, or write for Bulletin 141.



Part of large Carl-Mayer Recirculating Gas Fired Rack Type Oven installation at The General Electric Co.



Typical large Carl-Mayer Vertical Oven as installed for Electric Autolite, Fremont Foundry, Cadillac, General Motors, Packard Motor Co. and The General Steel Castings Corp.

Aluminum Co. of America
American Magnesium Corp.
American Radiator & Standard Sanitary Corp.
Babcock & Wilcox Co.
Bridgeport Brass Co.
Bucyrus-Erie Co.
Brown Industries Corp.
Dunkirk Radiator Co.
Eclipse Aviation Division of Bendix Aviation Corp.
Electric Autolite Co.
Ford Motor Co.
Fort Pitt Steel Casting Co.
Frank Foundries Corp.
Fremont Foundry Co.
G & C Foundry Co.
General Motors Corp.
The General Steel Castings Corp.
General Electric Co.
Gilbert & Barker Co.
International Heater Co.
Henry J. Kaiser Co.
Packard Motor Co.
Shenango Penn Mold Co.
Studebaker Corp.
Whiten Machine Works
Whiting Corp.

CARL-MAYER CORE AND MOLD OVENS

all types all sizes all fuels

CARL-MAYER, 3030 Euclid Ave., Cleveland, Ohio

This CONSERVATION PLAN

will help you

SAVE MAN-HOURS . . .

SAVE MATERIALS . . .

SPEED PRODUCTION

1. Conserve

by strategic selection, application and use of electrical equipment.

EXAMPLE

Standard gearmotors or speed reducers save materials required by sheaves, belts, chains and line shafts. In addition, they commonly effect power or energy savings up to 10.5%.

2. Conserve

by utilizing new developments that reduce need for critical materials and man-hours.

EXAMPLE

X-ray inspection detects defective castings or welded sub-assemblies before they are machined or assembled. It replaces "destructive" tests . . . reduces rejects . . . eliminates wasted machinery man-hours.

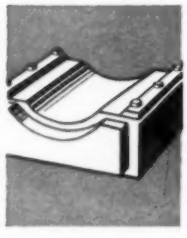
3. Conserve

by utilizing available facilities for preventing breakdowns and reducing machine outages.

EXAMPLE

"Maintenance Hints" — a complete, pocket-size manual covering recommended upkeep practice for electrical apparatus—is a maintenance help available without charge. Check your Westinghouse representative for copies.

4. Conserve



by utilizing materials which in many cases can replace critical materials and do a better job.

EXAMPLE

Micarta, a heavy-duty industrial plastic, outwears other materials in many bearing applications. Typical of many uses are steel mill roll neck bearings and marine stern tube and pintle bushings.

5. Conserve

by tapping all sources of salvageable scrap.

EXAMPLE

Systematic planning can uncover many ways of reclaiming worn equipment and waste material. Samples of salvage forms and organization charts in use in Westinghouse plants will gladly be made available on request.

Wartime Conservation means MORE than just conserving copper, steel, aluminum . . . it means the most strategic possible use of all of the ingredients of Victory—materials, man power, time and ingenuity.

These five major points comprise a complete program developed by Westinghouse for Wartime Conservation. This program packages up Westinghouse engineering experience in the entire field of electric and power equipment and related materials. Examples noted are but five of many specific recommendations.

This experience and these recommendations are offered fully and without obligation.

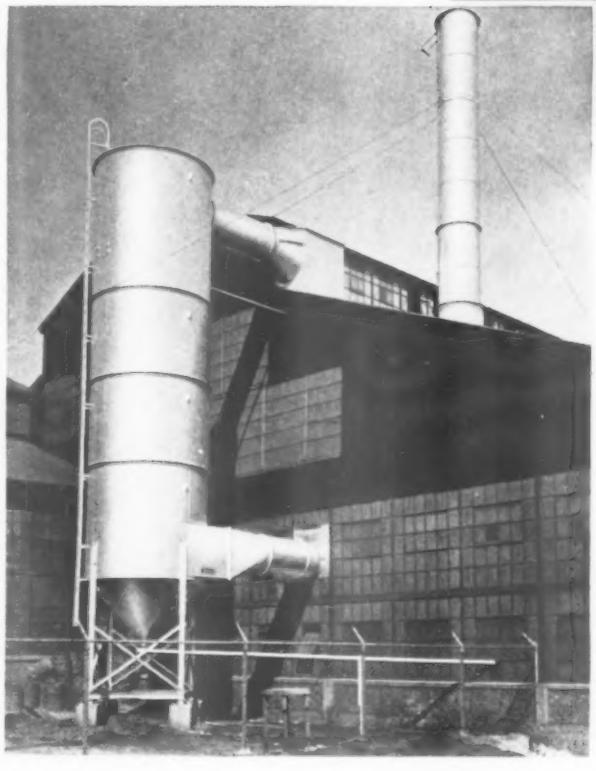
Ask your Westinghouse representative today for a copy of the new 100-page book, "WARTIME CONSERVATION." Or write direct to Dept. 7-N, Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.

J-90481

Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

Laborless Dust Collection



Today's demands for increased output make it imperative that minimum non-productive labor be used in maintenance departments or even in such essential work as keeping foundries free of dust and fumes. All available man-power must be concentrated on productive work to get our war job done quickly.

The conservation of labor embodied in Multi-Wash Dust Collectors by the elimination of the need for care or maintenance long before the present era naturally is of even greater value today. Operation is simply a matter of throwing a switch which starts the fan and water pump. No shake-down, no parts to lubricate, nothing to adjust or become inoperative.

The Schneible Multi-Wash Collector uses only water (or oil for magnesium dust) over and over again as the cleaning medium. They have no moving or rapidly wearing parts; no filters, screens, nozzles or other parts which have to be cleaned or replaced. There is nothing to break, burn, clog or become inoperative. The water or oil used as the washing medium is readily desludged with a Schneible Multi-Louver Dewatering Tank and is used again and again.

These exclusive characteristics likewise assure clean air at all times even in foundries operating on a 24-hour a day, six day a week, basis.

It will pay you to find out how America's leading foundries have eliminated their dust and fume problems and without the expenditure of labor.

Write for new Bulletin No. 143 on Schneible Multi-Wash Collectors and Bulletin No. 842 on Schneible "Uni-Flo" Dust Hoods.

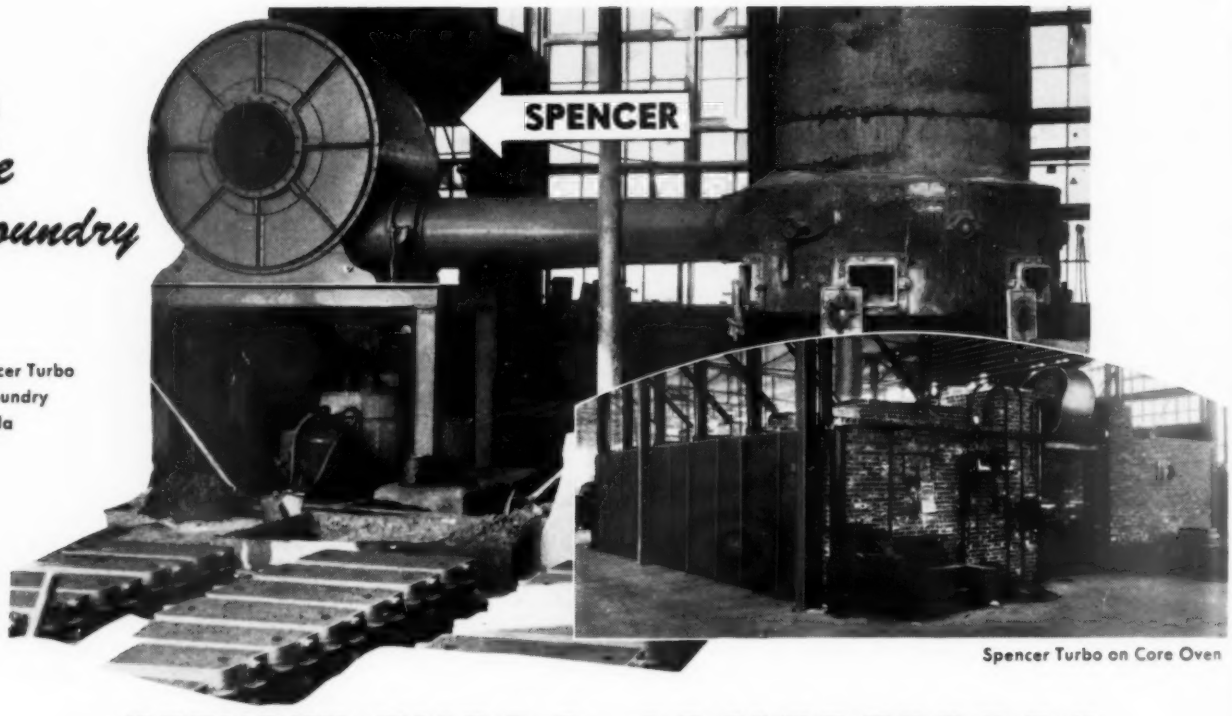
CLAUDE B. SCHNEIBLE COMPANY

3953 Lawrence Avenue, Chicago, Ill.

Engineering Representatives in Principal Cities

SCHNEIBLE

In the Foundry



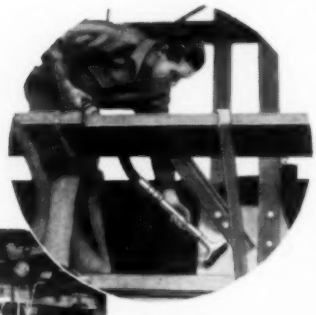
Spencer Turbo on Foundry Cupola

Spencer Turbo on Core Oven

SPENCER HARTFORD TURBO-COMPRESSORS

Spencer Turbo-Compressors serve foundries in many ways. For cupolas, the large multi-stage Spencer Turbos with wide clearances and long life are distinguished by the fact that a constant air pressure is automatically maintained regardless of conditions inside the cupola. A calibrated ammeter permits accurate control of the volume of air from any point on the pouring floor, or automatic air weight control can be furnished when desired for core ovens, heat treating and other forms of gas and oil fired equipment, Spencers are the recognized standard. They have been recommended repeatedly by the leading manufacturers of foundry equipment for more than a quarter of a century.

SPENCER HARTFORD VACUUM CLEANING



Spencer Vacuum in Foundry

Spencer Vacuum Overhead

Foundries have three sources of dust: the dust generated by the work itself, the dust stirred up by traffic, and the dust which comes down from overhead.

One man with a powerful Spencer Portable can cover large areas, even during working hours. It is faster, more thorough than other methods, and has a low operating and maintenance cost.

Spencer Vacuum is used in foundries for cleaning overhead structures, walls and beams, also to reclaim sand and steel shot used for blasting. Portable sizes from ¾ to 20 horse power. Stationary machines up to 100 horse power. Write for the Spencer bulletins.

THE SPENCER TURBINE COMPANY
HARTFORD, CONNECTICUT

251

To the FOUNDRYMEN of tomorrow

HOT STRENGTH

The strength developed by a sand mixture at any temperature above 230° F.

The basic materials in Core and Molding Sand Mixtures are Silica Grains, Bonds and Moisture.

Every material in a sand mixture influences Hot Strength.

High Hot Strength will cause Hot Tears, whereas low Hot Strength will cause Cutting.

Satisfactory Hot Strength values are readily obtained by the adjustment of Clays, Bonds and Moisture. For this purpose Lion Binder is the choice in many foundries.

Produce smooth castings and eliminate defects with good sand mixtures.

There's a McCormick Bond for every job.

J. S. McCORMICK COMPANY

25TH STREET AND A. V. R. R.

PITTSBURGH, PA.

LION BINDER—IMPERIAL BINDER—EASY CLEANER CORE COMPOUND

INTERNATIONAL MOLDING MACHINES

Pictures Taken at
CHICAGO MALLEABLE CASTINGS CO.
Chicago

1

2

The
INTERNATIONAL
Line of
Molding Machines
consists of

900 Different Sizes
70 Standard Types

Many special designs developed to meet individual purposes and conditions.

3

INTERNATIONALS

Fig. 1—Type LJSK Jolt, Squeeze, Hand Lever Lift Machine.

Fig. 2—Type PK-16 Jolt, Squeeze, Power Pin Lift Machine, for large work.

Fig. 3—Type GS Jolt Ram, Power Turnover, Power Draw Machine.

Fig. 4—Type G Jolt Ram, Power Turnover, Foot Draw Machine.

Fig. 5—Type LJS Jolt Squeezer.

Fig. 6—Type PKL Jolt, Squeeze, Power Pin Lift Machine, for small and medium work.

These Machines Are Described in Our "KEY" Catalog

4

5

INTERNATIONAL MOLDING MACHINE CO.

2608-2624 West 16th Street

CHICAGO, ILLINOIS, U. S. A.

6

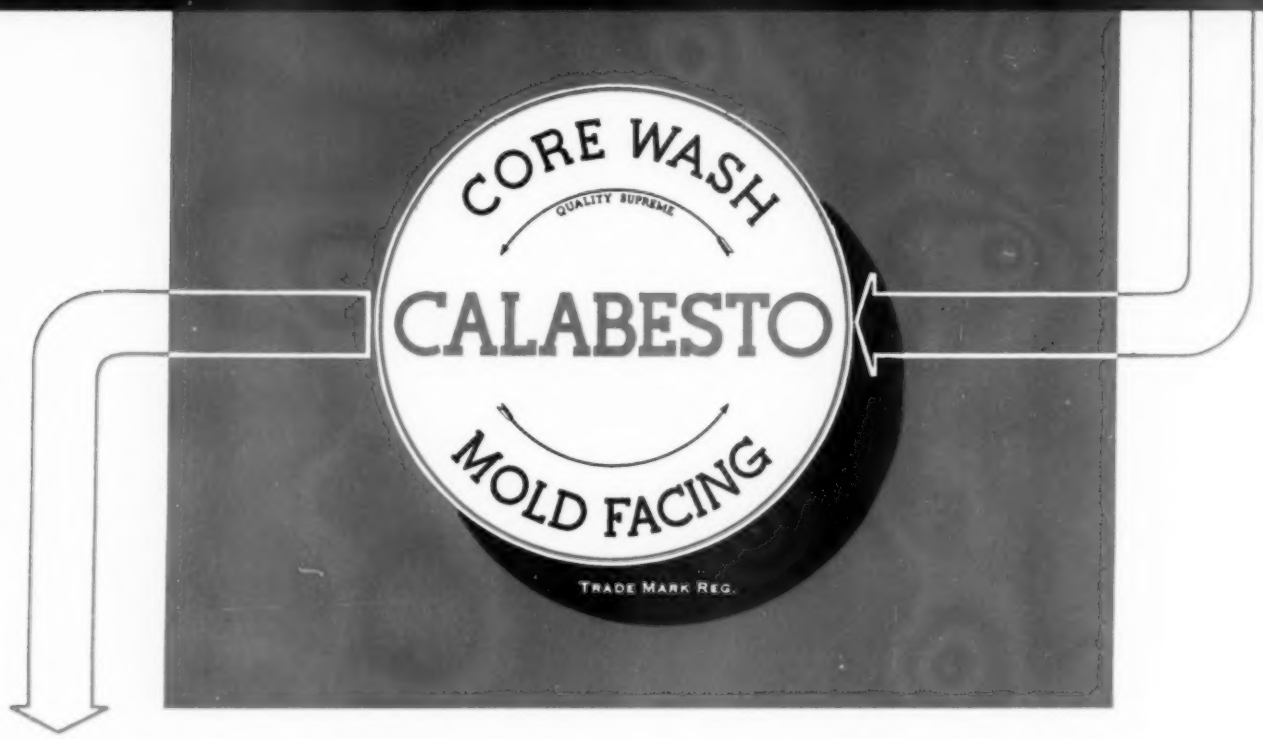
FOUNDRYMEN!

You are vitally responsible for the progress of the War Program. Your shop MUST operate continuously at MAXIMUM Production.

USE

INTERNATIONALS

Announcing Something New



For BRASS and BRONZE

We say CALABESTO is new—but its ingredients are old and well tested. This superior core wash and mold facing is prepared from a combination of heat resisting minerals of high refractory value. They were selected by experimental elimination, and the result, CALABESTO, is now offered to the non-ferrous foundry industry as a core wash and mold facing expressly manufactured for brass and bronze work.

CALABESTO is a departure from Plumbago washes and facings. It is remarkably clean, and does not draw dampness. Packed only in dry, powdered form, CALABESTO is made ready for use merely by mixing plain water with the dry powder. Then it can be applied by brush, swab or spray gun.

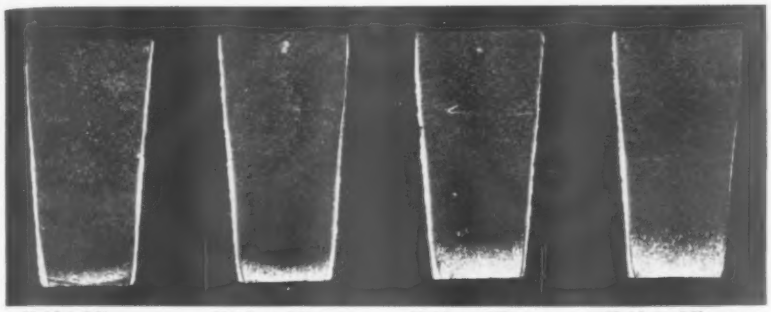
We urge non-ferrous foundrymen to get acquainted with CALABESTO, and to try it out on cores, sand molds and furnace linings.

Agents and jobbers who are interested, may write to us about CALABESTO, the new core wash and facing that came out of the West.

PACIFIC GRAPHITE WORKS

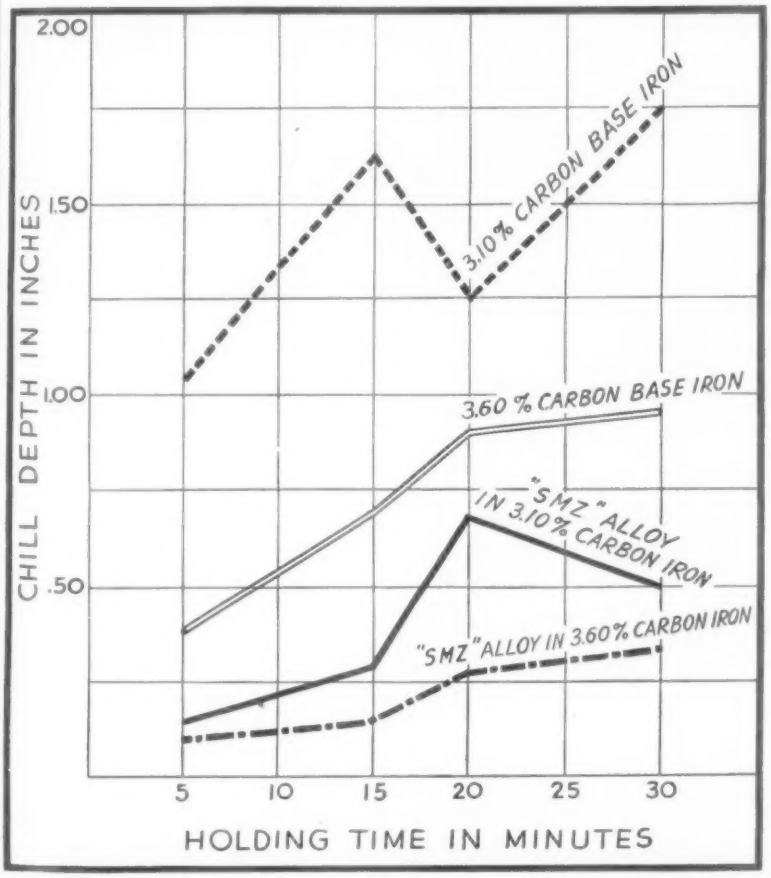
40th and LINDEN STREETS · OAKLAND, CALIFORNIA

"SMZ" ALLOY *Retains Graphitizing Power When Iron Is Held in the Ladle*



Held 5 Minutes Held 15 Minutes Held 20 Minutes Held 30 Minutes

Chill Blocks of 3.60% carbon iron treated with "SMZ" alloy.



Effect of holding time on chill depth in 3.10% carbon and 3.60% carbon irons untreated, and irons treated with "SMZ" alloy.

ADDITIONS of small amounts of "SMZ" alloy to cast iron in the ladle improve the strength, ductility, and shock-absorbing properties of the iron. Recent tests on 3.10% carbon and 3.60% carbon irons—chill blocks and graphs are shown at the left—indicate that iron treated with "SMZ" alloy and held in the ladle as long as thirty minutes is still satisfactorily graphitized.

Because "SMZ" alloy is a balanced alloy containing silicon, manganese, and zirconium, it produces iron of uniform structure and improved physical properties. By reducing the depth of chill, machinable iron is obtained even at the edges and corners and in thin sections. By using ladle additions of "SMZ" Alloy, foundries can readily make a high-strength cast iron from low-carbon, low-silicon iron.

Our metallurgists will be glad to discuss with you the advantages of "SMZ" alloy and how it can improve your iron. They can also tell you about the many other "Electromet" ferro-alloys and give you practical help in using them to obtain better iron. There is no charge for this service.

ELECTRO METALLURGICAL COMPANY
Unit of Union Carbide and Carbon Corporation
UCC
30 East 42nd Street, New York, N. Y.

"Electromet" and "SMZ" are registered trade-marks of Electro Metallurgical Company.

Electromet
Trade-Mark
Ferro-Alloys & Metals

Distributed through offices of Electro Metallurgical Sales Corporation in Birmingham, Chicago, Cleveland, Detroit, New York, Pittsburgh, and San Francisco. In Canada: Electro Metallurgical Company of Canada, Limited, Welland, Ontario.

STEEL FISTS HIT HARD

HERE'S A SCRAPPY PAIR FOR YOUR CLEANING DEPARTMENT

● CERTIFIED STEEL ABRASIVES, with fists of hardened steel—get tough jobs done in a hurry—by hitting hard and often—without harm to themselves or their users. Both SHOT and GRIT can "dish it out"—and they can "take it", too! Let them fight *for you* in your blast cleaning department. Let them *speed up your production*—cut down on your costs. They're a scrappy pair —ready to fight for you!

PITTSBURGH CRUSHED STEEL CO.
PITTSBURGH, PENNA.
STEEL SHOT AND GRIT CO.
BOSTON, MASS.

AIR POWER

The pressure of air upon the sail of a primitive canoe was undoubtedly one of the first instances of *air power* aiding man power. Centuries later, but still over two thousand years ago, man started to *compress* air to extend its use for practical purposes.

Through the years, the science of pneumatics has made possible much of man's progress. Today compressed air—*air power*— is essential in the performance of thousands of tasks, such as the mining, processing, and fabricating of the metals upon which we depend for our ships, planes, tanks, and guns. Air power and pneumatic tools are helping workers to improve their skill and to increase their production.

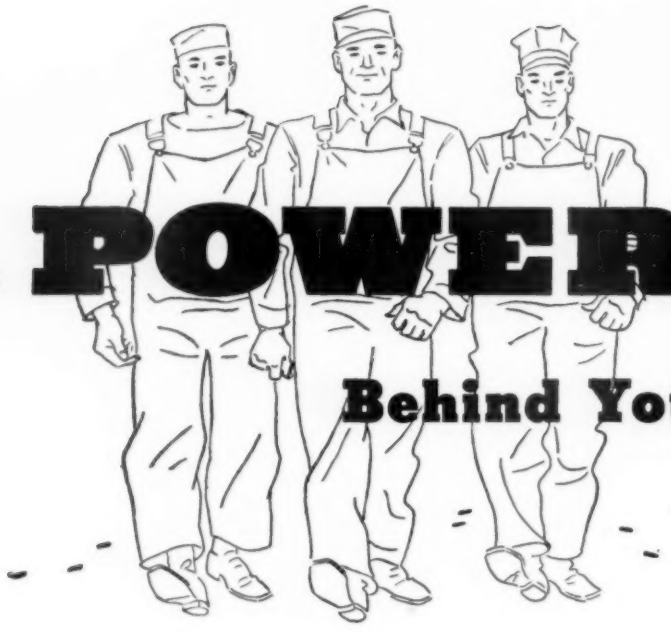
As the largest manufacturer of compressed air machinery, it is our responsibility to cooperate with you on compressed air problems. Our Engineering Service Division is available for this purpose.

Ingersoll-Rand

8-276 11 BROADWAY, NEW YORK, N. Y.

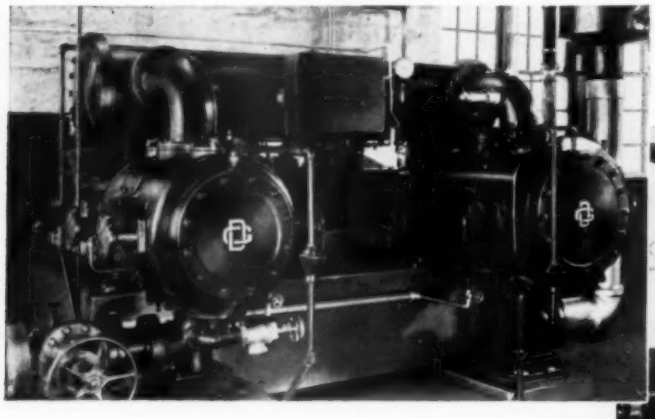
COMPRESSORS • AIR TOOLS • ROCK DRILLS • TURBO BLOWERS • CONDENSERS • CENTRIFUGAL PUMPS • OIL AND GAS ENGINES

More POWER Behind Your Manpower!!



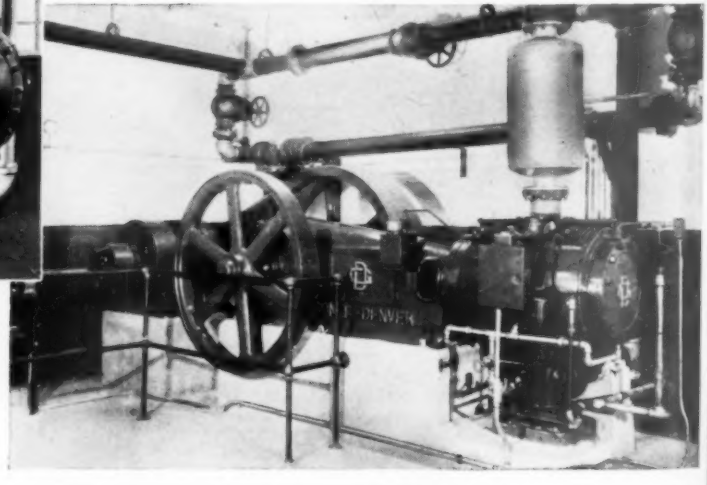
IN today's production battle, every man-hour counts for more when it's backed by plenty of power. Gardner-Denver Horizontal Compressors have long been famous as an ever-ready source of compressed air power. They're proving themselves under the grind of continuous operation in scores of war plants today—taking in stride the extra hours—the extra demands for air output.

Their dependable performance is based on such advanced design features as extra rugged frame construction . . . Timken roller main bearings . . . entirely automatic capacity control.



Engineered for continuous heavy-duty performance—the Gardner-Denver "HA" Two-Stage Horizontal Air Compressor is built in capacities from 468 to 1854 cubic feet displacement per minute.

Designed for unusually low horsepower requirements—Gardner-Denver "RX" Single-Stage Horizontal Air Compressors are built in capacities from 89 to 1292 cubic feet displacement per minute.

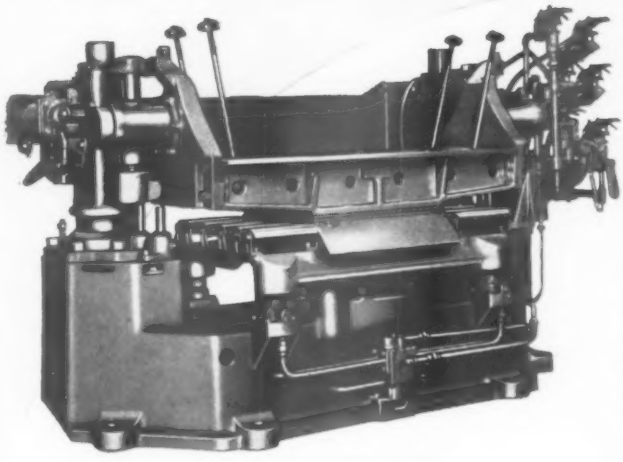


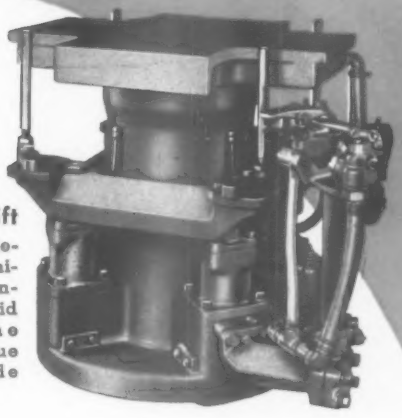
Write for bulletin giving complete information on Gardner-Denver "HA" Two-Stage and "RX" Single-Stage Horizontal Air Compressors. Gardner-Denver Company, Quincy, Illinois

GARDNER-DENVER *Since 1859*

MILWAUKEE MOLDERS

Designed • Built • Sold and Serviced BY EXPERIENCED FOUNDRYMEN

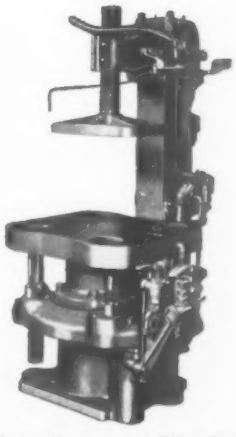




Jolt Pin Lift
Simple in design to eliminate maintenance. Rigid draw frame insures true draw. Made in 6 sizes.

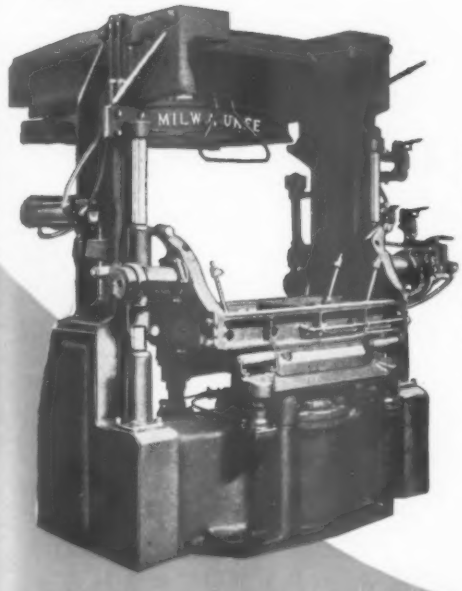
Jolt Rollover Draw
Equipped with automatic air clamps, power rollover, quick-acting pistons and instantaneous hydraulic leveling. Draw pistons above or below floor line. Available with or without jolt. 6 sizes.

Jolt Squeezers
Stationary or portable — Parallel squeeze maintained indefinitely. 4 sizes —10", 12", 13" or 18" squeeze pistons.



Jolt Squeeze Stripper
Arm type, production molder with air-dogging mechanism for stripping. Available with 16" or 19" squeeze pistons.

Jolt Squeeze Pin Stripper
The triple duty molder. Use it as a jolt squeezer, as a jolt squeeze pin stripper or pin lift machine. 5 sizes available —12", 14", 16", 19" and 21" squeeze pistons.



Jolt Squeeze Rollover Draw
Power rollover with automatic leveling and smooth pattern draw. 3 sizes available—16", 19" and 21" squeeze cylinder diameters.

Jolt Squeeze Stripper
Car suspended squeeze platen permits fully automatic overhead mold removal. 21" or 24" squeezing pistons.

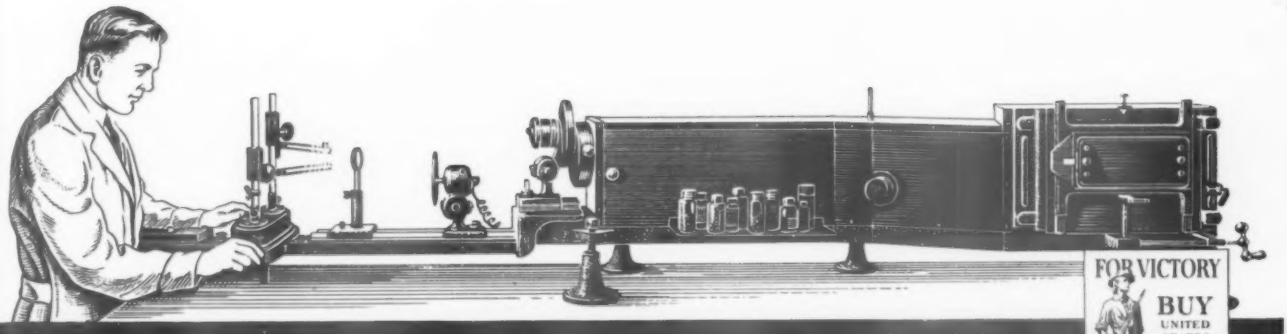
MILWAUKEE FOUNDRY EQUIPMENT CO.
238 WEST PIERCE STREET • Cable Address "MILMOLDCO" • MILWAUKEE, WISCONSIN

FANNER CHAPLETS

Whatever your CHAPLET requirements may be,
there is a FANNER CHAPLET to fit the job.

THE FANNER MANUFACTURING COMPANY, CLEVELAND, O.

THE CANADIAN FANNER LTD., HAMILTON, ONTARIO, CANADA



Sees All-Tells All!

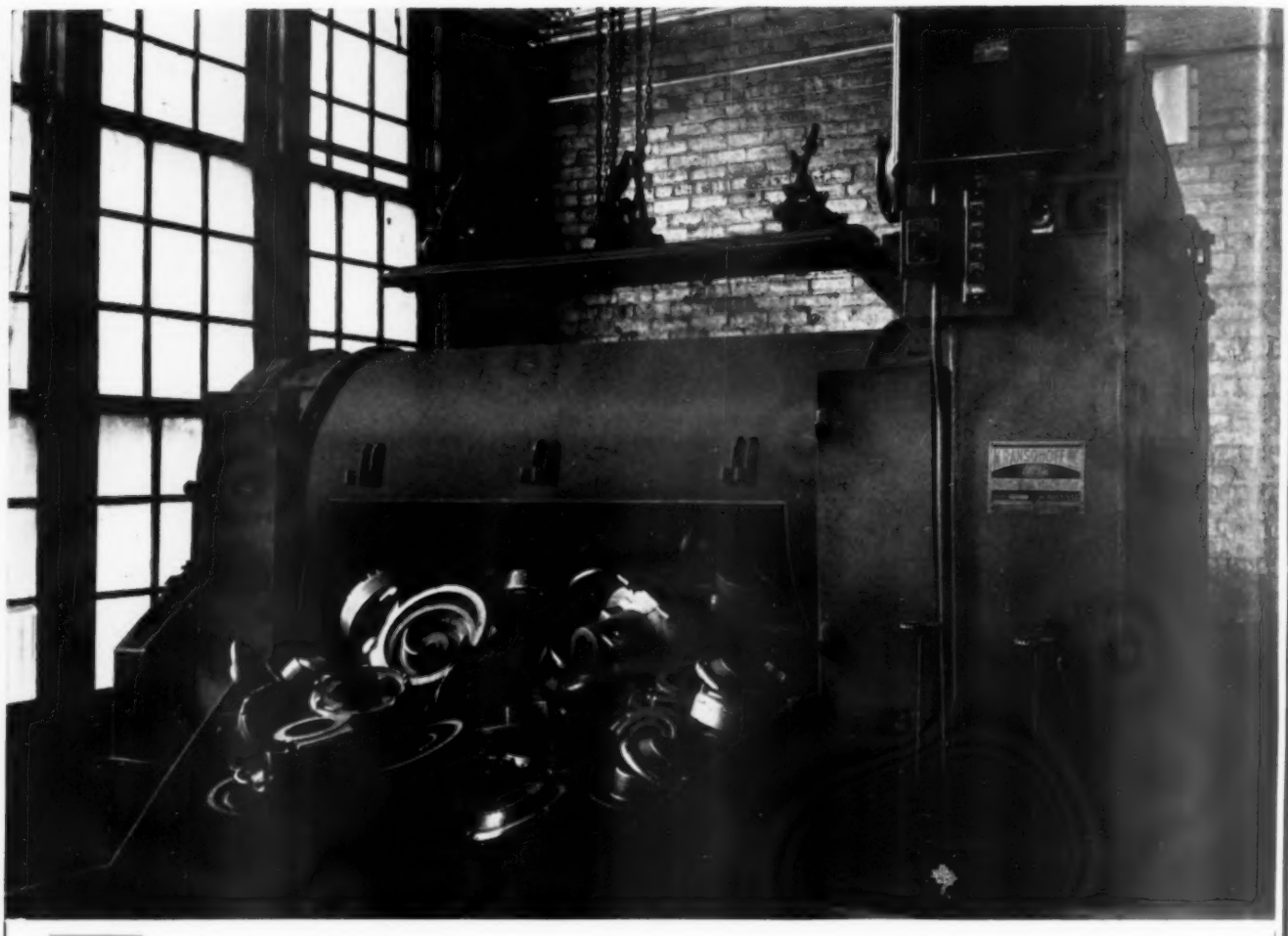
The magic eye of the Spectograph, for which this brilliantly illuminated arc lights the way, literally sees all and tells all about the metals in process of smelting in the various huge batteries of furnaces in Michigan Smelting plants. While the metal is still molten in the furnace, control of the elements in the alloy is now possible. In the most scientific, fastest way, the Spectographic method tells Michigan Smelting technicians of every element and in what quantity, it is present in the sample drawn from the furnace charge. This is only one of the many technical controls developed and used here at Michigan Smelting Division—controls that enable the smelting of non-ferrous alloys to rigid specifications, and of a high quality that never varies.

MICHIGAN SMELTING
AND REFINING

DIVISION OF
BOHN ALUMINUM AND BRASS CORPORATION
DETROIT, MICHIGAN

GENERAL OFFICES • LAFAYETTE BLDG.

NON-FERROUS SCRAP METAL REFINERS FOR 50 YEARS



When there's so much to do and so little time to do it . . .

Can't take time to go into a huddle . . . daren't fool with untried ideas . . . no patience with hit-or-miss methods. These days you must be sure you're doing things the right way the first time. You want what you want, how you want. . . . and you want it in a hurry. To be sure your casting cleaning is right in every way . . . install and put your confidence in

RANSOHOFF

Automatic Star-Return

TUMBLING MILLS

speedy . . . gentle . . . automatic handling of stars . . . the shortest cut to best results

Side-loading, side-unloading wet mill. A hot solution is pumped through the mill while tumbling; clear rinse solution pumped through while stars are returning. Castings discharged on chute to sorting table.

THE RANSOHOFF WET METHOD

Castings cascade in a mass in which stars are intermingled thoroughly. All voids are filled completely. Stars vary in size and shape. Results: very rapid cleaning without nicking, breaking or excessive wear on mill lining. Stars enter and return automatically. Replacement costs are at a minimum. Wet method eliminates dust & dust collectors, reducing health hazards.

N. RANSOHOFF, Inc.

CINCINNATI, OHIO

Township Ave. and Big 4 R. R.

In Active Service!

SAHARA
AND
REXALL
FOUNDRY BELTING

On the industrial front PERFORMANCE today is doubly vital. Outstanding results are the best sales ammunition, and we have an arsenal full. Here's an example:

A 124' length of 20" x 6 ply SAHARA Belt conveying very hot sand from the shake-out — a job side-stepped by some belting manufacturers—gave over 50 per cent more service than all competition and lowest ultimate cost. (NAME ON REQUEST)

★

CONTAINS NO RUBBER. PRE-WAR QUALITY IN EVERY DETAIL POSITIVELY MAINTAINED

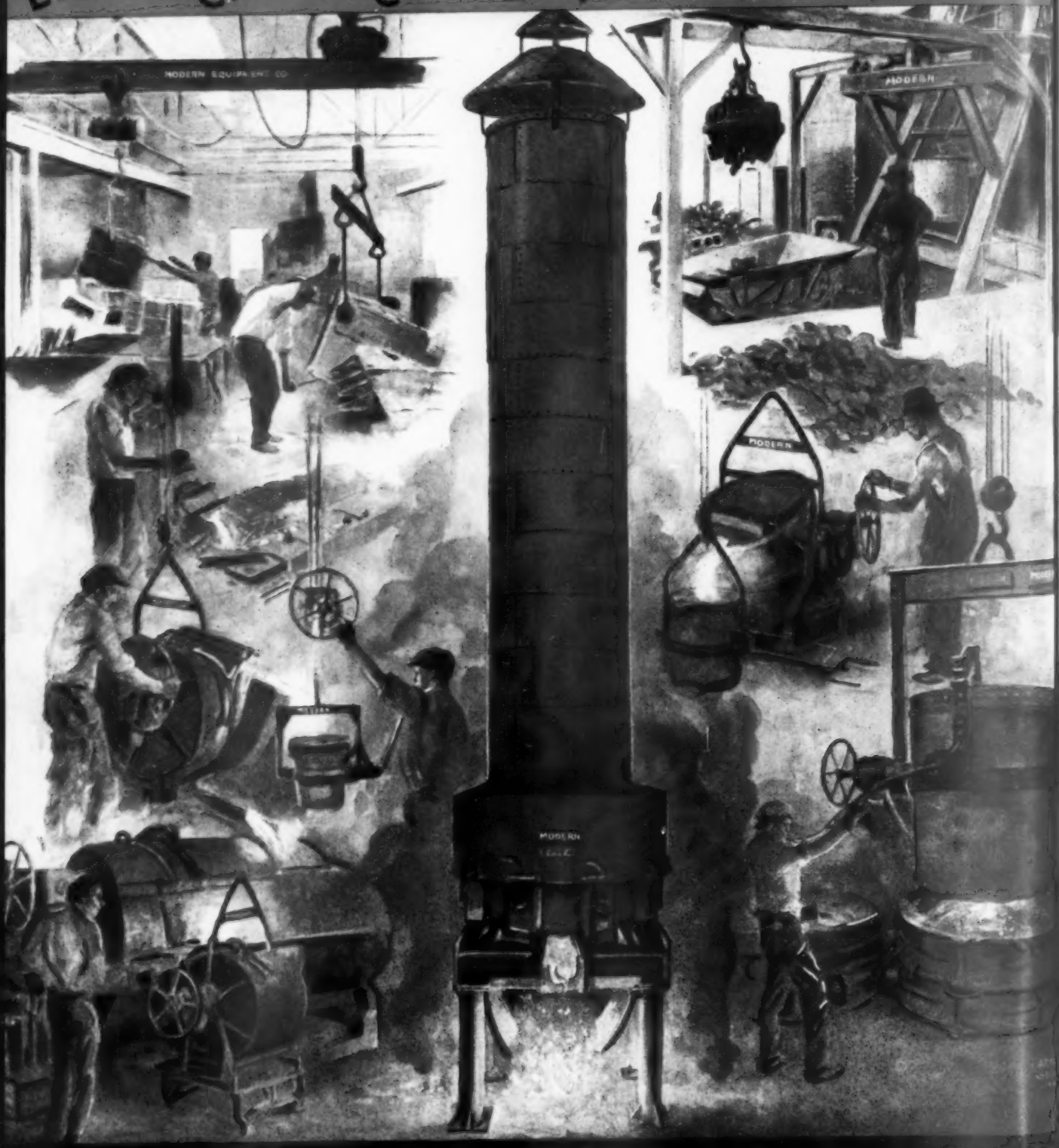
★

IMPERIAL BELTING COMPANY

1750 S. KILBOURN AVE. CHICAGO, ILLINOIS

WIN VICTORY with MODERN

LADLES CRANES CUPOLAS AND POURING DEVIC



MODERN EQUIPMENT CO.
PORT WASHINGTON, WIS.

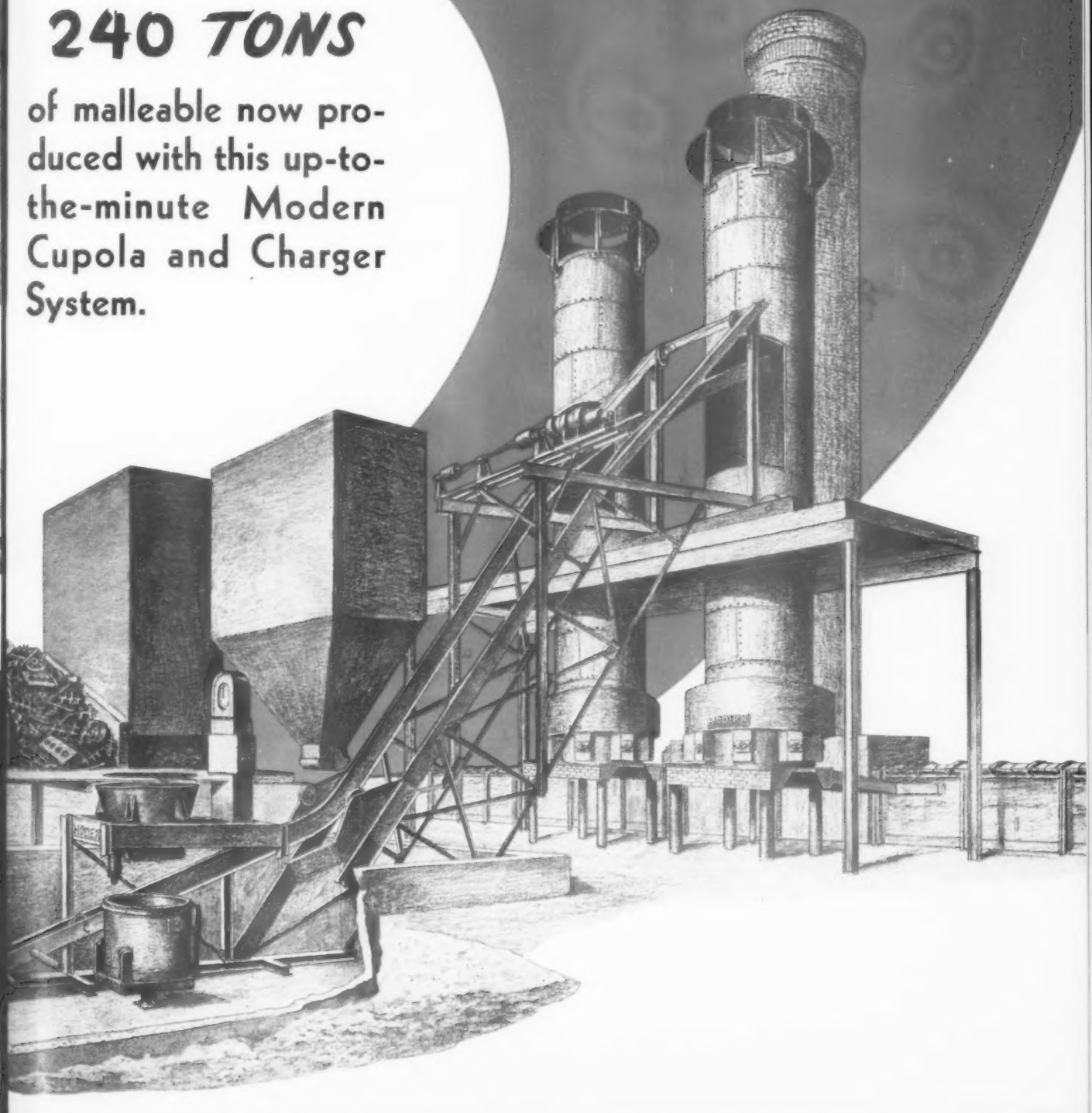
Lifetime Geared Ladles • Covered and Insulated Ladles • Improved Bottom Pour Ladles • Metal Pouring Systems.

MODERN MELTING

NOW EMBRACES DUPLEXING IN MALLEABLE IRON FOUNDRIES.

240 *TONS*

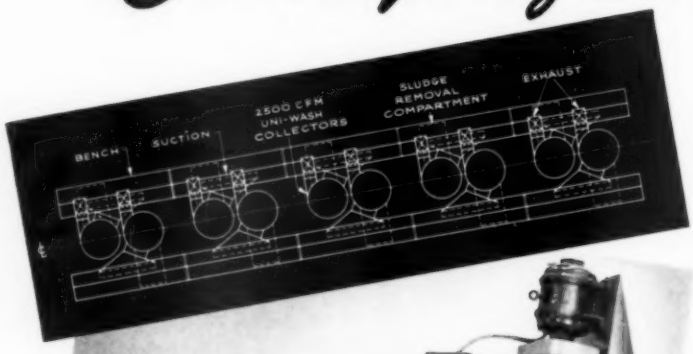
of malleable now produced with this up-to-the-minute Modern Cupola and Charger System.

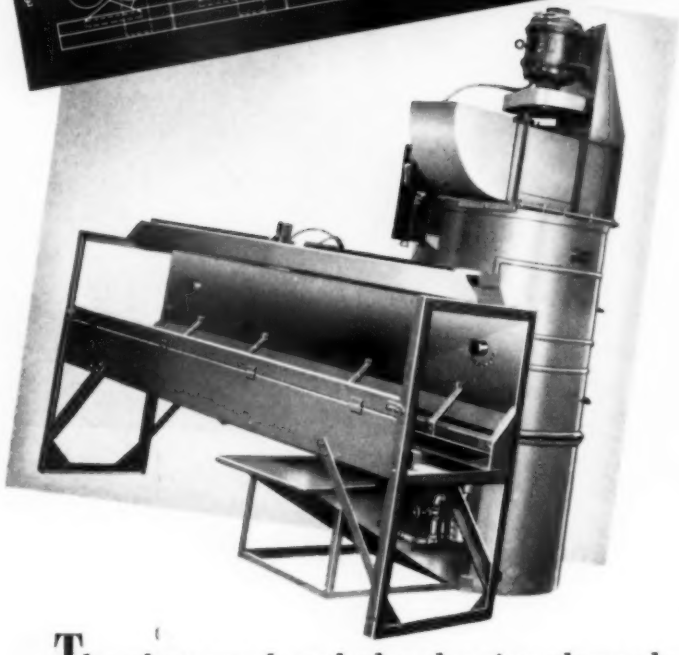


Cupolas - Cupola Chargers • Furnace Charging Cranes • Crane and Monorail Systems for Metal and Mold Handling.

MODERN EQUIPMENT CO.
PORT WASHINGTON, WIS.
DEPT. 195

Conveyorized Grinding of PROPELLER BLADES using UNI-WASH Dust Collectors





The photograph and plan drawing above show one way in which the Newcomb-Detroit Uni-Wash Dust Collector can be easily adapted for specialized use. Well over a hundred of these units have been installed in the plant of a mid-western propeller manufacturer and more are constantly being added.

The set-up consists of a standard Uni-Wash Dust Collector attached to a booth. Inside the booth are fluorescent lights and two rails on which the fixture holding the propeller blade travels. The dust is drawn into the dust collector through a slot that runs the length of the booth.

Several of these units are placed end to end in a row and a man at each booth performs the proper grinding operation and then rolls the fixture down the line to the next man. Because of the large amount of metal removed from each blade, Uni-Wash's proved principle of dust removal is ideal for the job.

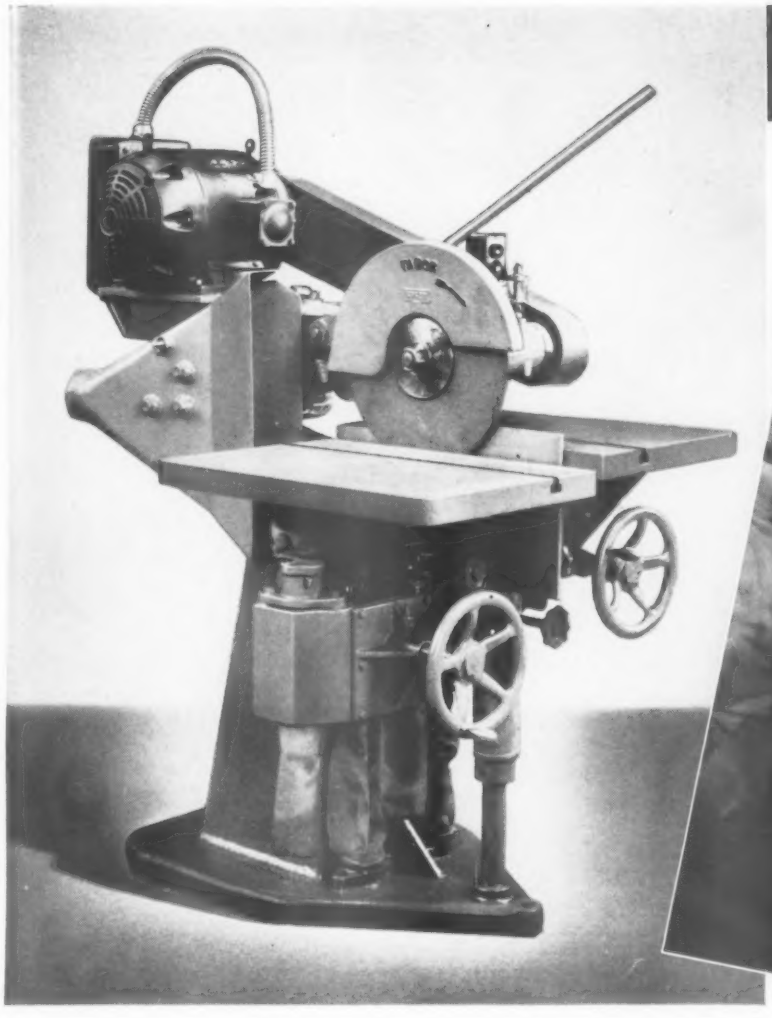
There are other reasons why Uni-Wash was chosen. Because there is a choice of inlet locations it was possible to build right and left hand units so that two rows could be placed back to back. Since the Uni-Wash itself takes up so little floor space this means a double saving. And the sludge can be cleaned out from the front of the benches.

Find out today where Uni-Wash can increase the efficiency of your production. Newcomb-Detroit engineers are always at your service.

NEWCOMB-DETROIT COMPANY

5751 RUSSELL STREET — *Established 1912* — DETROIT, MICHIGAN

Dust Collectors • Paint Spray Booths • Drying Ovens • Metal Parts Washers and Rust Proofing Systems • Exhaust and Ventilating Systems • Carburizing Systems • Other Sheet Metal Equipment



TABOR
TRADE 1884 MARK

TABOR-BRASIVE CUT-OFF MACHINES

Users say . . .

". . . We highly recommend the Cut-Off Machine which we purchased from you a few months ago. It is a real saving in time, money and labor. Before we purchased this machine, we used saws and this process was long. The machine saves us both time and labor as it cuts the castings much quicker and better. We have also eliminated the heavy expense of the band saws and we find that the expense connected with the machine is far less than the amount of the saws used . . ."

And

". . . advising you again how pleased we are with the machine. It has been running steadily since we received it in June (two months) without a single break-down of any sort, and it has made hundreds of cuts during this time.

. . . Assuring you that at any future time we may be in need of machines of this nature, we will certainly contact you first, we are, etc."

Tabor-Brasive Cut-Off Machines save time, money and labor in cutting gates and risers from castings of manganese bronze, nickel, Monel and other non-ferrous alloys, as well as alloy steel. Built in a complete line of sizes and types to meet any cutting need.

THE TABOR MANUFACTURING COMPANY
6225 Tacony Street • Philadelphia • Pennsylvania

Representatives: Snyder Foundry Supply Co., *Los Angeles, Calif.;* Pacific Graphite Works, *Oakland, Calif.;* Carl F. Miller & Co., *Seattle, Wash.*

When Johnny, Mike, Pete and Mary

come marching home!

THAT will be the Great Day when the victorious boys—and the girls—come back to the wide open arms of America.

A Great Day that isn't so far away.

They probably haven't realized it but Industry has found the time somehow, apart from its tremendous war effort, to plan and develop new things that will enhance and improve our future living.

New developments in metals and alloys, fuels, plastics, chemicals, rubber, foods, synthetics, textiles—and electronics which will be reflected in the coming higher standards of peace-time living.

Right now in thousands of laboratories—in pilot plants—on the drawing boards—in the conference rooms—Industry is experimenting, planning, discussing.

And in many of these almost revolutionary processes that are already under way or are being planned, super refractories by Carborundum are considered as vitally important factors.

If you, too, are working on or considering a new process involving the use of refractories, there is undoubtedly one or more Carborundum Brand Super Refractories that will improve the efficiency of your operation.

It may be that your conditions call for a refractory having high refractoriness or high heat conductivity.

Perhaps resistance to spalling or softening or great strength at elevated temperatures is most important.

Whatever the essential quality, characteristic or application may be, we are confident that super refractories by Carborundum and our research and engineering will prove invaluable.

We would welcome the opportunity of consulting with you.

REFRACTORY CARBORUNDUM PRODUCTS

Refractory Division, **THE CARBORUNDUM COMPANY,** *Perth Amboy, N. J.*

REG. U. S. PAT. OFF.

MANUFACTURERS OF GRINDING WHEELS, COATED ABRASIVES, SUPER REFRACTORIES, HEATING ELEMENTS

District Sales Branches: Chicago, Philadelphia, Detroit, Cleveland, Boston, Pittsburgh. Distributors: McConnell Sales and Engineering Corporation, Birmingham, Ala.; Christy Firebrick Company, St. Louis, Mo.; Harrison & Company, Salt Lake City, Utah; Pacific Abrasive Supply Company, Los Angeles, San Francisco, Calif.; Denver Fire Clay Company, El Paso, Texas; Smith-Sharpe Company, Minneapolis, Minn.

(Carborundum is a registered trade-mark of and indicates manufacture by The Carborundum Company)

CLEARFIELD'S

SHORT MIXING CYCLE—

—SPEEDS UNIFORM QUALITY MOLDING SAND

An operator and a Clearfield Mixer get things done on today's war production schedules!

The little 404 shown above is good for anywhere from 10 to 25 tons per 8 hour day depending upon the type of sand, loading facilities, etc.—and the sand is mixed right!

Clearfield Mixers are available in sizes to produce from 4 up to 40 cubic feet per batch, with essential features that dovetail into the simplest or most elaborate systems.

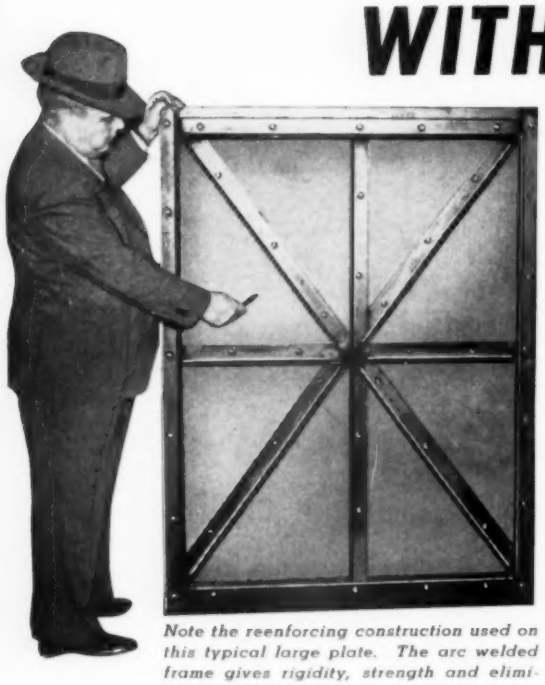
WRITE

Information and estimates promptly furnished. For a definite proposal, please state quantity and type of sand to be conditioned and characteristics of available electric current.

CLEARFIELD
MACHINE COMPANY

CLEARFIELD
PENNSYLVANIA, U. S. A.

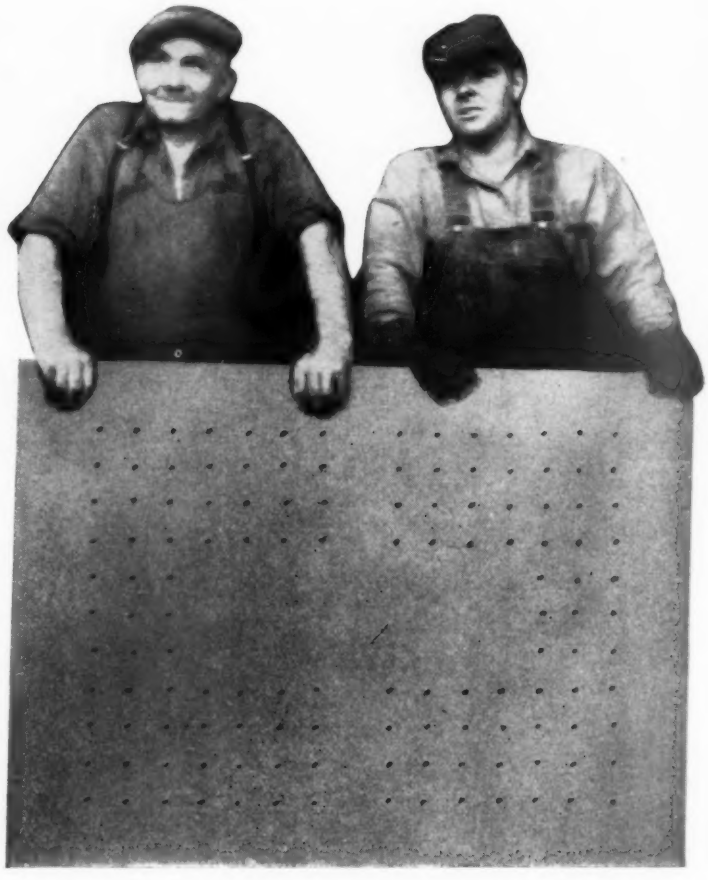
CARRY CORES UP TO 1200 LBS. WITHOUT DEFLECTION!



Note the reenforcing construction used on this typical large plate. The arc welded frame gives rigidity, strength and eliminates deflection.

IT IS BEING DONE ON DIAMOND REENFORCED STEEL CORE PLATES

These special core plates are designed to carry large cores up to 1200 lbs., cores of any size, without deflection or warping.



You may obtain Diamond Core Plates to suit your own special requirements. They are furnished with or without perforations and in all smaller, standard sizes—plain or reenforced as indicated by your needs.

Send us detailed information on your core baking problem and we'll be glad to design a plate to handle the job. Weight of core and dimensions, in particular.

DIAMOND

CLAMP AND FLASK COMPANY

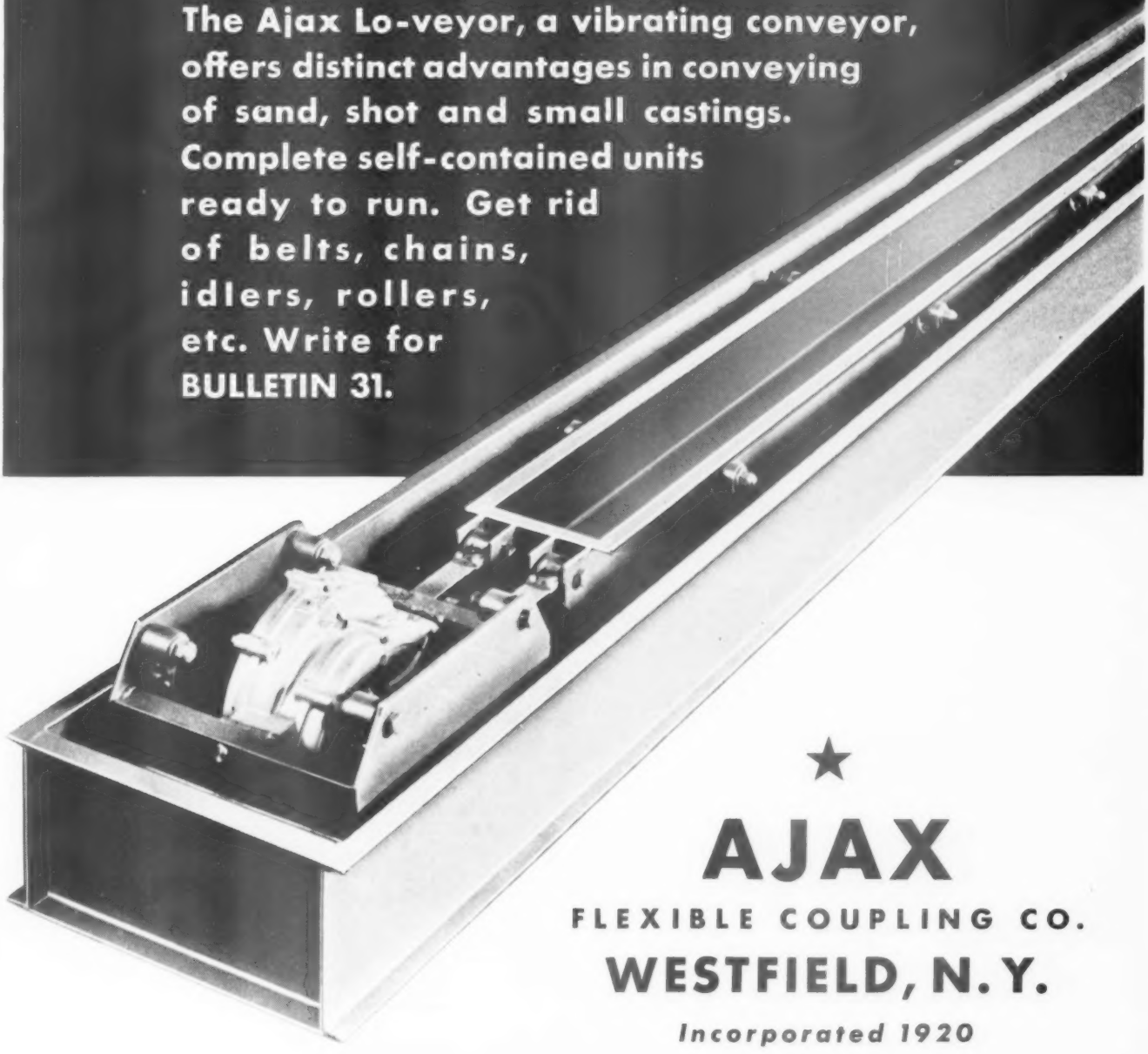
Telephone 2553 **Richmond, Indiana**

Designers of* CORE PLATES, JACKETS, BANDS, FLASKS *since 1889

AJAX

LO-VEYORS

The Ajax Lo-veyor, a vibrating conveyor, offers distinct advantages in conveying of sand, shot and small castings. Complete self-contained units ready to run. Get rid of belts, chains, idlers, rollers, etc. Write for **BULLETIN 31.**



★

AJAX

FLEXIBLE COUPLING CO.

WESTFIELD, N. Y.

Incorporated 1920

★

P. S. They are working good on ore, too.

CONTINUOUS PERFORMANCE

At LOW MAINTENANCE Cost

Rigid---90% Steel 4-Nozzle Air Blast

AIR BLAST
Sand, Shot or Grit

Conserve critical material and labor by using

TAX FREE AIR

with lowest repair and operating costs

ESPECIALLY SUITABLE for Small and Medium Size CASTINGS, FORGINGS, etc.

One 9-Barrel User Said: "No Headaches to keep this Machine in Production."

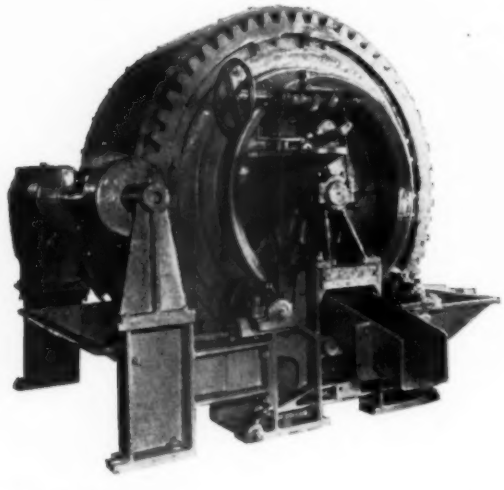
AIR CONTROLLED BLAST will produce required finish.

WRITE for BULLETIN "SW" and Questionnaire for GUARANTEED CLEANING COSTS, PRODUCTION and FINISH of your product.

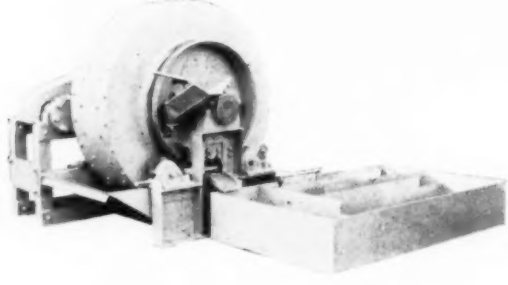
WAR PRODUCTION

Quoting C.M.P. Page 5, Par. d, Recommending Appropriate Action to make the Most Efficient Use of Controlled Material through Changing Specifications.

NON-FERROUS AND ALLOY STEEL FOUNDRIES making Munitions, Valves and Many Other Products for the Army and Navy are Reclaiming and Remelting Metal from SKIMMINGS, SPATTERS, CINDERS, AND SLAG.



Rate of Feed—3000 to 6000 pounds per hour. No. 6 size Mill —settling tanks with automatic Sludge Ejector, not shown.



COMPLETE GRINDING AND CONCENTRATING UNIT

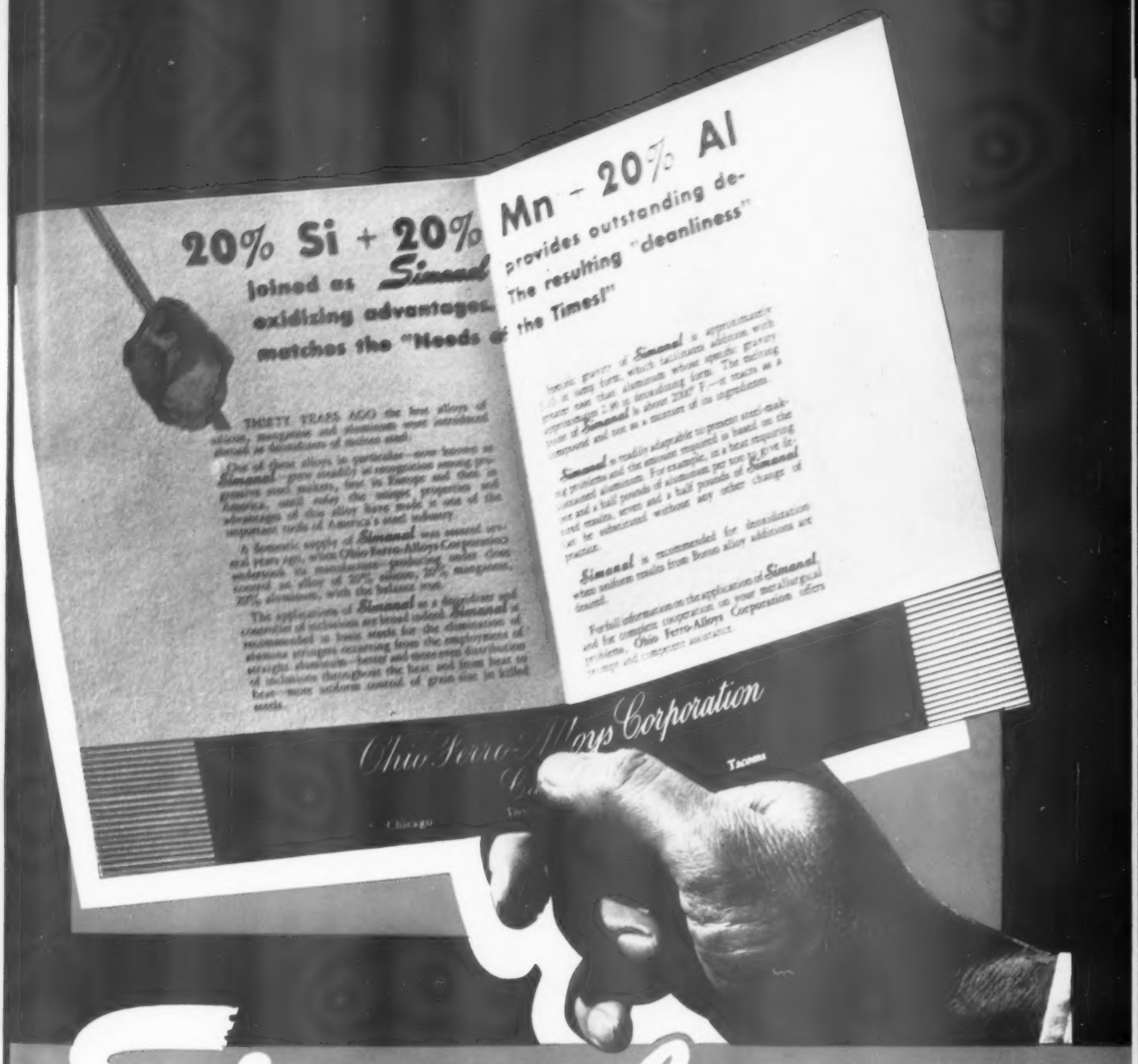
Rate of Feed—800 to 1200 pounds per hour. No. 4 size Mill —complete with settling tank. Also No. 5 size, not shown. A very exacting user's statement: "We have found that by keeping these types of dross separate and remelting the metallic content after processing in your mill, that a suitable ingot can be procured which can be melted directly back into specification production."

INSTALLATION COST RETURNED IN 3 TO 12 MONTHS

TOTAL RECLAIMING COSTS FROM 1/10 TO $\frac{1}{4}$ CENT PER POUND. MOST EFFECTIVE AND LOWEST MILLING COSTS WITH MANGANESE STEEL CRUSHING ROLLS, WITH FLEXIBLE MOUNTING TO PASS MILL FEED SIZE PIECES. WRITE FOR BULLETIN "M".

DREISBACH ENGINEERING CORPORATION

15 WARBURTON AVE. YONKERS, N. Y.



Simanal

AN EFFICIENT ECONOMICAL DEOXIDIZER AND CONTROLLER OF GRAIN SIZE AND INCLUSIONS IN PRESENT DAY STEEL MANUFACTURE . . . *YOU WILL BE INTERESTED IN OUR BROCHURE DESCRIBING THIS REMARKABLE FERRO-ALLOY!*

PHILO · DEPENDABILITY · QUALITY · SERVICE

RAINIER · DEPENDABILITY · QUALITY · SERVICE

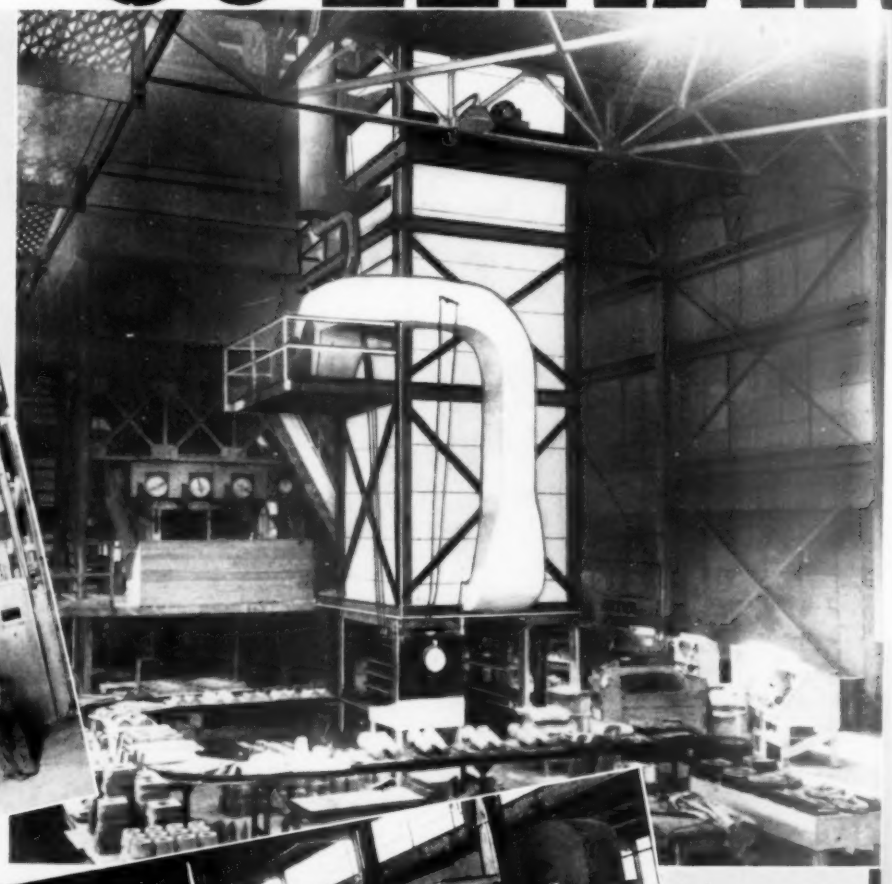
Ohio Ferro-Alloys Corporation

Canton, Ohio

Chicago Detroit Pittsburgh Tacoma

Get COLEMAN

COLEMAN Tower Ovens
for high-speed production. Amazing savings in floor space and production costs.



COLEMAN Transrack Ovens
for operation with portable racks. Single or multiple rack capacity.

COLEMAN Rolling Drawer Ovens
for speedy baking of small and medium cores.

COLEMAN CORE AND MOLD OVENS

THE FOUNDRY QU
BUILDERS OF COLEMAN S
CLEVELAND, HIO

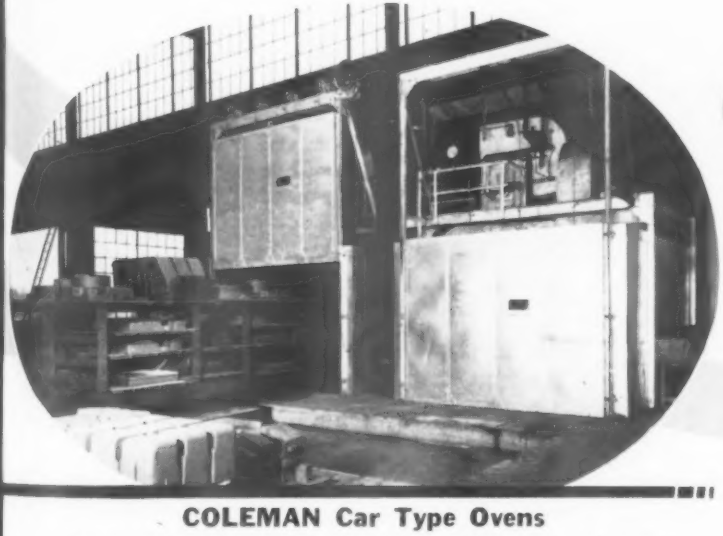
OVENS Now!..

for MORE PRODUCTION with LESS LABOR, LESS FUEL

FOR nearly 40 years, we have specialized in the production of core baking and mold drying ovens.

To fully appreciate the amazing results obtainable with Coleman Ovens, we urge you to see them in operation—see their SPEED, their PERFORMANCE, their LABOR SAVING, their FUEL ECONOMY.

Dependability under around-the-clock operating conditions proves the value of Coleman in-built stamina. Coleman Ovens are backed by a complete guaranteed service with undivided responsibility, from design to operation.



COLEMAN Car Type Ovens
for core baking and mold drying. No job too large.

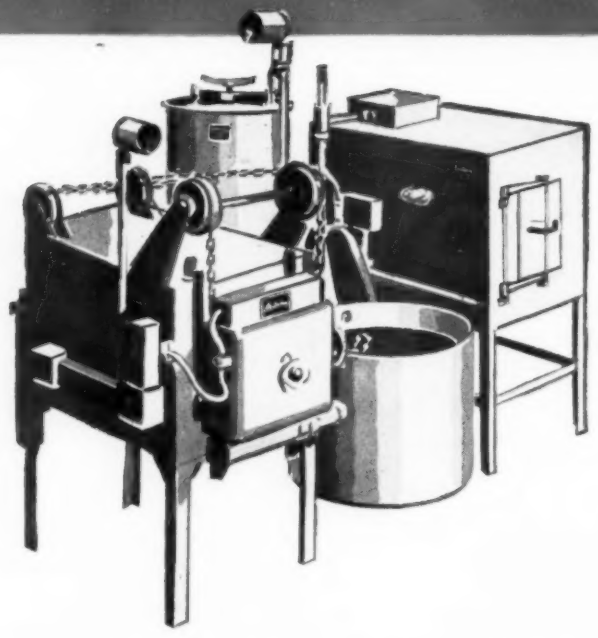
Over 7,000 Installations
IN AMERICA'S LEADING FOUNDRIES

All types. All sizes. Built for whatever fuel is most easily and economically available in your district.

Write for Folio of Bulletins.

R) QUIPMENT CO.
EMAD SWARTWOUT OVENS
AN, HIO, U.S.A.

COLEMAN CORE AND MOLD OVENS



A double play in the toolroom . . .

from HYDRYZING to Quench Tank to CYCLONE!

An unbeatable combination, supplied complete by Lindberg, teams up to give you the most efficient and economical setup for the precision heat treatment of tools and dies.

. . . **from Hydryzing,** the expense of costly cleaning operations is eliminated because the neutral, controlled atmosphere prevents scale, decarb and carburization. The clean surface of the Hydryzed parts assures a full, uniform hardness when the parts are transferred

. . . **to the quench tank,** insuring the maximum life for tools and dies. Incidentally, with toolroom setups, Lindberg can supply quench equipment to meet any specifications, complete with tank, coolers, pumps, storage tanks and temperature controls.

. . . **to the Cyclone** Toolroom Tempering Furnace any tool or die can be entrusted with complete confidence. The parts are heated by 100% forced convection with a uniformity and control accuracy which allows temper tolerances of ± 1 Rockwell "C."

Thus is precision heat treating accomplished—Hydryzing insures the time and money put into the machining of the tool or die and the Cyclone puts it into long, productive service with the specified toughness to carry through.

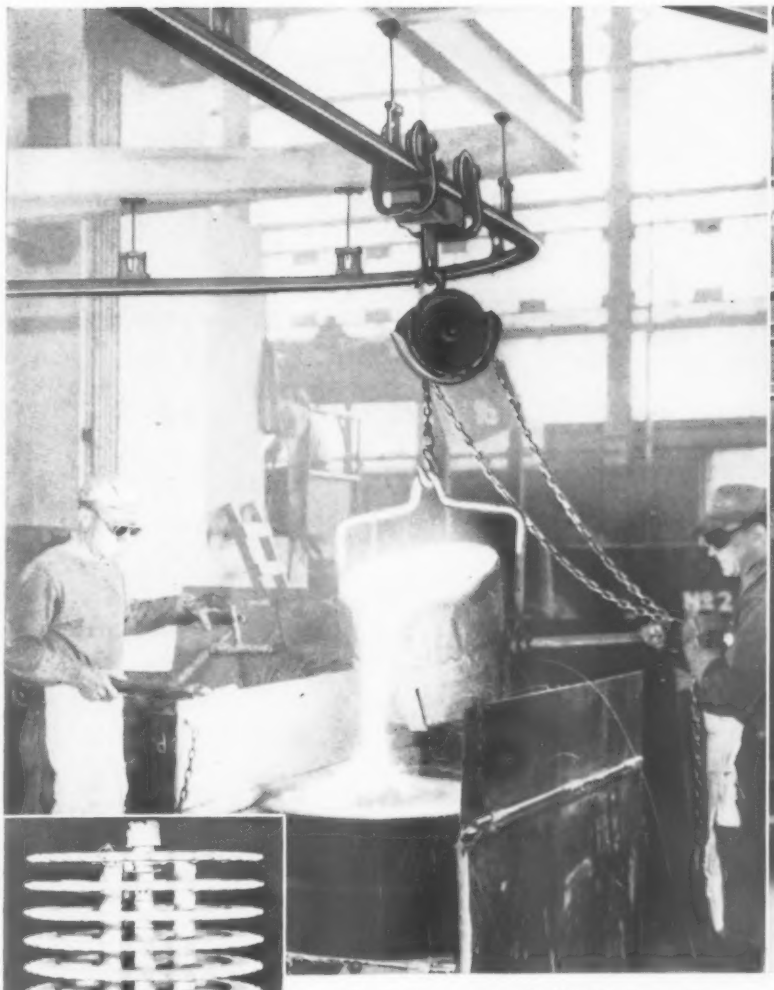
You can have all the advantages of a winning team—write TODAY for Bulletin 94 on Hydryzing and Bulletin 62 on the Cyclone Toolroom Tempering Furnace.

LINDBERG ENGINEERING COMPANY
2453 WEST HUBBARD STREET • CHICAGO

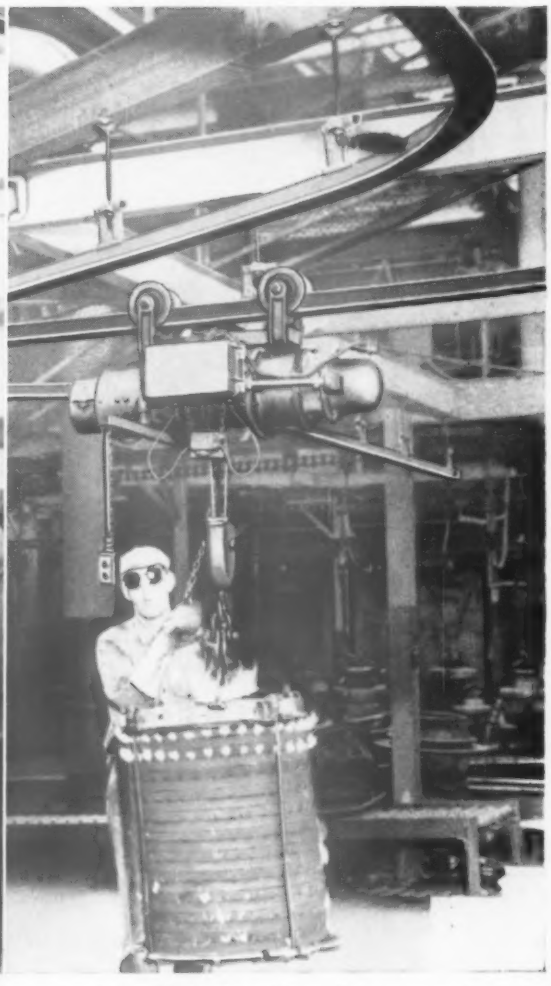
LINDBERG FURNACES

ARMY E NAVY

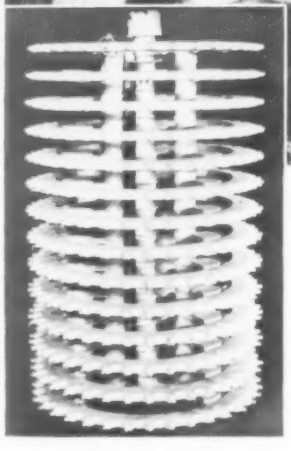
SUPER-CYCLONE for hardening, normalizing, annealing, tempering
CYCLONE for accurate, low-cost tempering and nitriding
HYDRYZING for scale-free and decarb-free hardening



Metal is transported directly from the furnaces and poured into the spinning molds with the Cleveland Tramrail overhead system without rehandling.



Immediately after the molds are poured they are picked up with the electric hoist and taken to the shake-out.



$1,720,000 SAVED
(Annually in Labor and Materials)

8,860,000 pounds materials and 725,000 man-hours are estimated saved annually by casting these track drive gears by the centrifugal method. Only machine operations required on castings are boring inside diameter and drilling holes.

•

CENTRIFUGAL POURING EFFECTS HUGE SAVINGS IN LARGE CANADIAN FOUNDRY

Huge savings are being made in money and materials in one of the world's largest foundries by casting numbers of similar parts at one time in Christmas tree clusters by the centrifugal method.

This work is speeded by the use of a Cleveland Tramrail overhead materials handling system that transports hot metal directly from the furnaces and pours it into the spinning molds without rehandling. Electric hoists pick up the poured molds and deliver them to the shake-out.

Centrifugal pouring has brought about tremendous savings both in materials and labor. Because of the accuracy with which parts can be cast, very little machining is required and machine-tools are saved.

Cleveland Tramrail equipment is ideally suited for this work. It eliminates heavy lifting, aids safety and makes possible top production.

GET THIS BOOK!

BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy.

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
1155 EAST 283RD ST. WICKLIFFE, OHIO.

CLEVELAND TRAMRAIL

OVERHEAD MATERIALS HANDLING EQUIPMENT

Announcing

the New Hydraulically-Operated 30 Inch

MASTER DISC GRINDER

For Increased Pattern Shop and Foundry Production Efficiency
Uses Heavy Abrasive Wheel or Flexible Back Discs
Adaptable to Grinding of All Foundry Metals, Wood or Plastics
Table Can Be Raised or Lowered by Hydraulics
Table Also Can Be Tilted by Hydraulics
Dust Collecting Facilities Can Be Provided at Extra Cost
Write for Complete Information Now!

THE KINDT-COLLINS COMPANY

12651 ELMWOOD AVENUE CLEVELAND, OHIO

"Everything for the Pattern Shop"

When You Need a Refractory Bonding Mortar With MAXIMUM BONDING STRENGTH

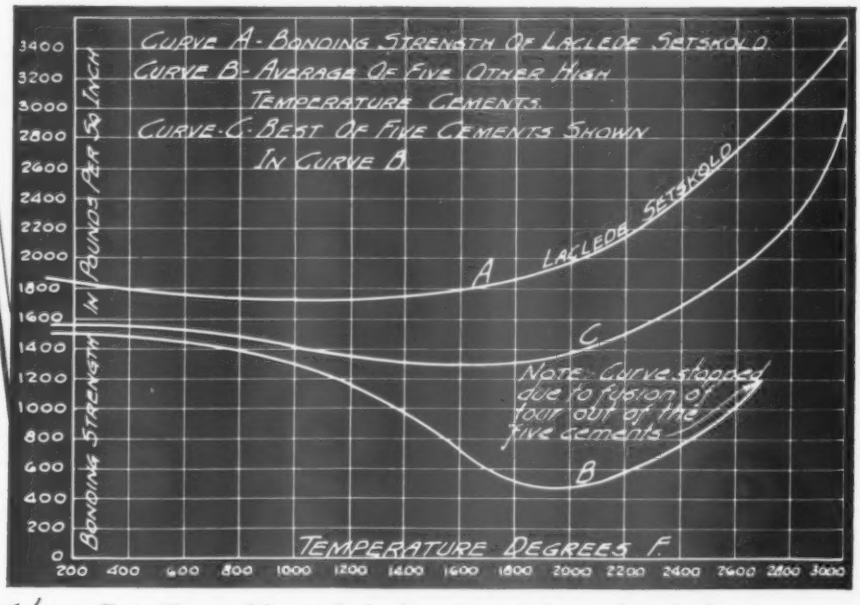
Specify

LACLEDE

SETSKOLD

OR

SETSKOLD C-7



Facts illustrated by graph clearly and accurately reveal result of tests on five brands of refractory cements as compared with Setskold.

Guard against failures of refractories due to inferior grades of bonding mortar. For a satisfactory job, the mortar is just as important as the brick, so be sure you select the mortar that is best for your job.

When you want a high temperature bonding cement with a bonding quality that makes a solid rock-like wall — that is uniform and dependable — and is noted for its economy of application, ask for Laclede Setskold (diaspore base cement), or Setskold C-7 (Kyanite base super-cement).

Both of these products are resistant to spalling, erosion, slag, and adhesion. Wipe out these enemies of production and save labor, materials, and time. Why take a chance on failure when you can get Setskold or Setskold C-7 from your local dealer or agent. ***Get his name from your local telephone directory or write direct.***

LACLEDE ENGINEERING SERVICE

When you have a problem involving refractories, call in a Laclede-Christy engineer. Because Laclede-Christy offers a *complete* line of refractories, he will give you an unbiased recommendation — the *right* recommendation for your job. Complete blueprints and estimates will be furnished without cost or obligation.

Write for complete details on Setskold and Setskold C-7.

LACLEDE-CHRISTY FOUNDED 1844 ST. LOUIS, U.S.A.

LACLEDE-CHRISTY

CLAY PRODUCTS COMPANY

Ambassador Bldg., St. Louis, Missouri

World's Largest and Most Diversified Line of High Temperature Refractory Specialties

Presenting MID-WEST'S "B" BOND WHEEL *for* GRINDING TUNGSTEN CARBIDE

NOW, after more than a year of the most severe tests known to mechanical science, we formally present the MID-WEST "B" BOND WHEEL, designed and built especially for grinding tungsten carbide parts.

For more than a year, while our "B" BOND wheels were being used in production plants throughout the United States, we restrained our pride, refrained from mentioning them in any advertising. Our factory tests told us we had produced a GOOD wheel for tungsten carbide grinding. But we wanted to be certain our engineers had produced a BETTER, MORE EFFICIENT wheel for that type of work.

And now we know! Now we know the MID-WEST "B" BOND WHEEL, by virtue of its splendid performance in actual production usage, is worthy of the MID-WEST label. MID-WEST "B" BOND WHEELS have three outstanding features: THEY CUT FASTER. THEY CUT COOLER. THEY CUT SMOOTHER.

Order MID-WEST "B" BOND WHEELS today. Reasonably prompt delivery.

Mail Today

Gentlemen: *Please send me further details on MID-WEST "B" BOND GRINDING WHEELS.*

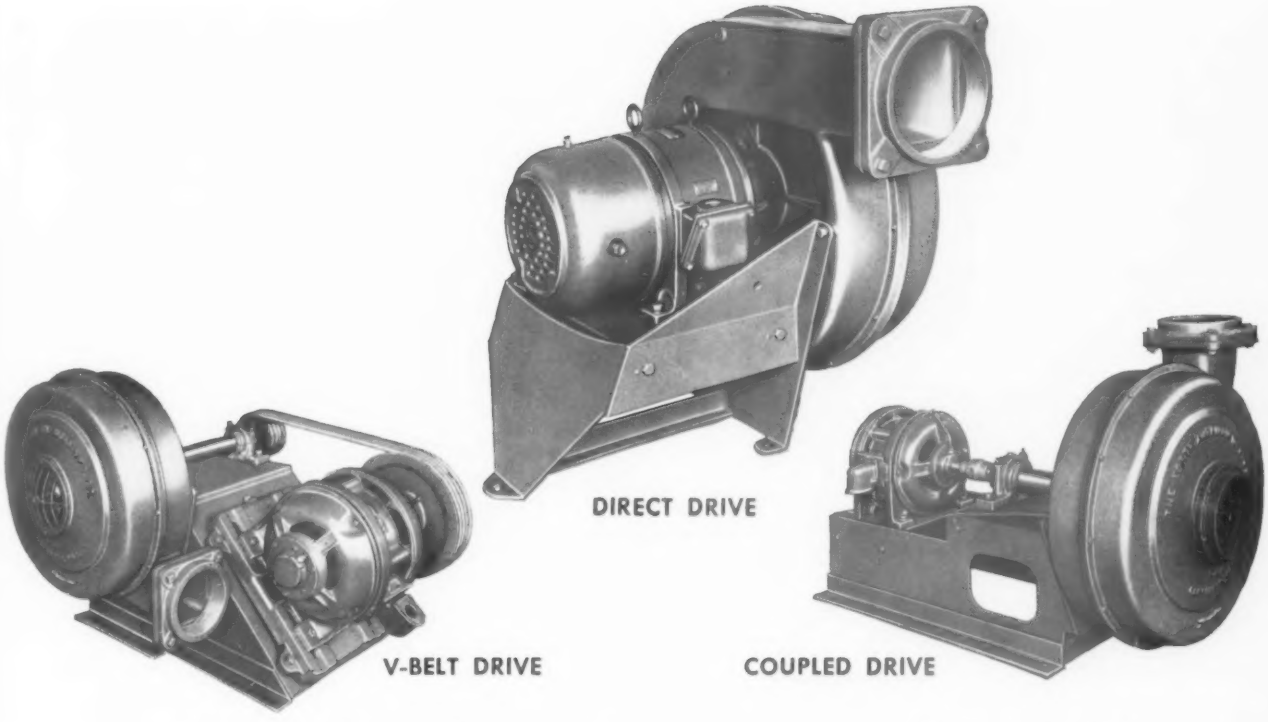
Name _____

Address _____

MID-WEST ABRASIVE COMPANY

Manufacturers of DEPENDABLE Abrasives

1960 E. MILWAUKEE AVENUE DETROIT, MICHIGAN



Any Style—Large or Small!

NORTH AMERICAN

TURBO BLOWERS

ALL HAVE THE SAME SUPERIOR QUALITIES

STURDY CONSTRUCTION

Each NORTH AMERICAN Turbo Blower has a sturdy base of welded steel. The housings are of cast iron to insure rigidity and the gradual contours so necessary for smooth efficient flow of air.

SMOOTH QUIET OPERATION

The light weight, fabricated impellers are perfectly balanced, thereby guaranteeing quiet, vibrationless operation. Bearing failures disappear, since each NORTH AMERICAN Turbo Blower is carefully tested at the plant before shipment. Pressure, volume, balance, speed, current consumption and proper electrical characteristics of the motor must be correct before the Blower can be shipped.

EASY TO INSTALL

No special padding or special foundations are required when you install a NORTH AMERICAN Turbo Blower. In an emergency, however, you can change the position of discharge, disassemble or assemble the entire machine easily and quickly.

SIZE SELECTION

From long experience in combustion engineering, our Field Engineers know the correct volume and pressure necessary to make your job click. Let us save you money by recommending the right sized Blower for your job—not too large—not too small. NORTH AMERICAN Turbo Blowers are available from 4 oz. to 32 oz. and from 60 cfm to 4300 cfm. Write for our latest blower literature.

THE NORTH AMERICAN MANUFACTURING COMPANY

MANUFACTURERS OF INDUSTRIAL FUEL BURNING EQUIPMENT FOR GAS OR OIL

BRANCH OFFICES *with* FIELD ENGINEERS *in* PRINCIPAL CITIES

CLEVELAND, OHIO

When cast iron welds must be of HIGH QUALITY...

...here's what to do!

Welding gray iron castings where a machinable surface is required and where color, structure, and expansive characteristics must be retained — is best assured by use of Airco No. 95 Dipped Coat Electrode.

Welds properly made with Airco No. 95 have a refined, close-grained structure with a tensile strength of 25,000-35,000 lbs. p.s.i. Their hardness averages 15 to 20 on the Rockwell C scale — 87 to 97 on Rockwell B — and 250 to 275 Brinell. The welds are hard, yet machinable, and are usually stronger than the casting itself.

Call or write your nearest Air Reduction office for prices, priorities, and additional details.

Air Reduction

General Offices: 60 EAST 42nd ST., NEW YORK, N. Y.

IN TEXAS: MAGNOLIA-AIRCO GAS PRODUCTS CO.

General Offices: HOUSTON, TEXAS

AIRCO

WILSON

IDLE CYLINDERS ARE PRODUCTION SLACKERS: *Keep 'em rolling for victory!*

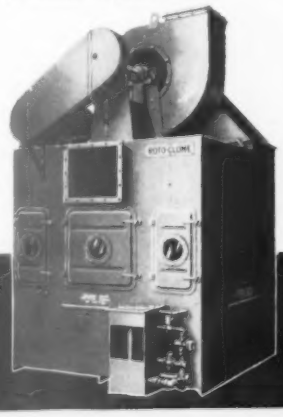
Safe MAGNESIUM DUST Control

Above: Unit Type ROTO-CLONE, Class 500, Size No. 1½, 1500 cfm. A complete self-contained Dust Collector, ideally suited for individual installations of magnesium grinding stands or metal buffers and polishers.

Below: Unit Type N ROTO-CLONE Class 500, size No. 6, 6000 cfm. For service with central system exhausting from a number of dust sources.

One of the hazards in working with magnesium comes from the magnesium dust created by grinders, buffers, polishers, etc. To meet all requirements for the safe handling of this dust AAF engineers have developed the Type N Roto-Clone, which is available in the form of Benches and Units.

Distinguishing features of the Type N Roto-Clone are the elimination of all restrictions, ledges or recesses where damp magnesium dust could be deposited, and the precipitation of dust under liquid, one of the proven safe methods of storing this material.



BUY WAR BONDS

If you have a magnesium dust problem write for Roto-Clone Bulletin No. 277, which will be sent without obligation.

AAF
AMERICAN AIR FILTERS

AMERICAN AIR FILTER CO., INC.
INCORPORATED
266 CENTRAL AVE. LOUISVILLE, KENTUCKY
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There's a Hidden Gold Mine in your USED CORE WIRE!

RECLAIM IT WITH KANE & ROACH CORE WIRE STRAIGHTENERS

Savings up to $150 a month are often reported by enthusiastic users of Kane & Roach Core Wire Straighteners! Don't neglect this hidden source of cash! Your used wire—even if it's badly bent—can be restored over and over again with these fast-working, economical machines. Now—when conservation of all metal is a vital factor in war-industry, Kane & Roach Straighteners fulfill a more important need than ever. Kane & Roach machines not only save valuable core wire but they pay for themselves so fast that scores of foundrymen have reordered as many as three or four after a short trial of one.

Here's Why Kane & Roach Is Your Best Bet!

There's an excellent reason why Kane & Roach Straighteners are in such demand—that's because they're built to do a long-term heavy-duty job, and do it better, faster and cheaper. This claim is substantiated by foundrymen everywhere—who know and rely on Kane & Roach, the company that has specialized in designing and building high-quality straighteners for the steel industry since 1887. You owe it to yourself and to the industry to invest in a K&R machine for superior straightening of badly-needed core wire.

The NEW K & R CORE WIRE STRAIGHTENER

Works Better, Lasts Longer, because . . .

- 3 ADDITIONAL straightening rolls plus the pinch rolls, all of hardened steel.
- Roll gears are cut-steel, hardened.
- Drive gears run in oil.
- Maximum safety—guard encloses all moving parts.
- Pressure-release cam handles prevent jamming.
- Motor drive shielded from grit.
- Cabinet base encloses and protects sturdy, high-power motor.
- Extraordinarily long wear for all parts.
- Cut-off can be furnished for straightening and cutting new wire from the coil.

K&R

Cash in NOW! Send today for our new circular 58-B—the first step to savings.

KANE & ROACH, Inc., Syracuse, N. Y.

I want to know more about K&R new core wire straighteners. Send me Bulletin 58-B, without obligation. My sizes of wire are: .....

Company .....

Individual .....

Street .....

City and State .....

KANE & ROACH

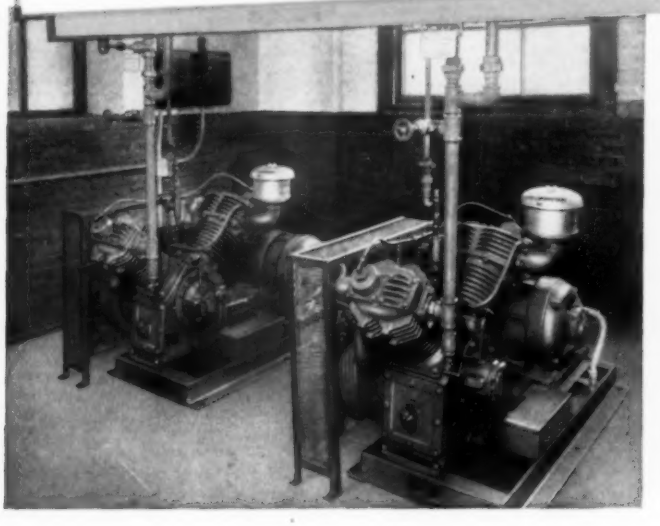
SHONNARD AND NIAGARA STS.

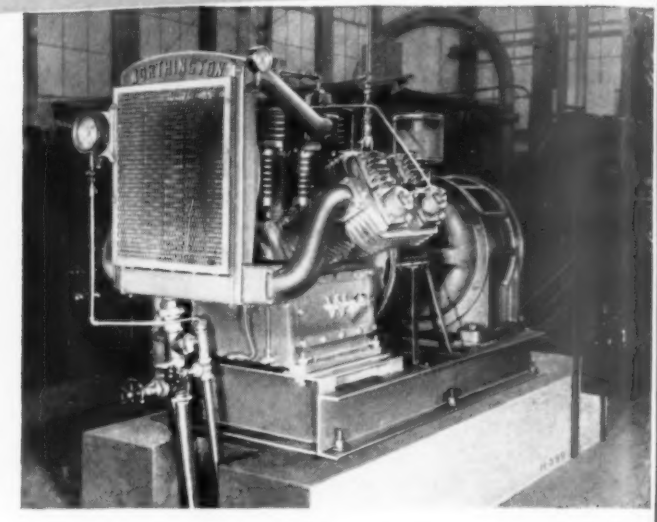
SYRACUSE, N. Y., U.S.A.

COMPRESSED AIR . . . WHERE YOU WANT IT . . . WHEN YOU WANT IT . . .

WORTHINGTON RADIAL TYPE AIR-COOLED UNITS

READILY PLACED CLOSE TO POINTS WHERE AIR IS NEEDED





Do your expanded activities call for additional compressed air . . . or for air at locations not served by your present equipment? In either case, consider these points in favor of Worthington radial type units:

AIR-COOLED . . . No water piping to install or maintain.

PORTABILITY . . . No foundation required. Can be set up quickly at any convenient place, and moved easily to meet changing needs.

COMPACTNESS . . . Minimum floor space requirements.

RELIABILITY . . . Incorporate the same basic design features as in the larger Worthington compressors . . . assuring years of uninterrupted operation at high efficiency.

District Office Engineers and our Authorized Dealer, in your territory, are ready to assist in selecting the correct type and size of compressor for your particular requirements.

WRITE FOR BULLETIN H-620-B16F.

AC3-5

WORTHINGTON FEATURES

- **FEATHER VALVES.** Considered by leading engineers as the simplest, lightest and most efficient valves ever developed for compressor service.
- **AIRPLANE TYPE CONNECTING RODS.** With balanced radial design, all rods connect to single crankpin bearing, held rigid by four bolts.
- **FORCE-FEED LUBRICATION TO CRANKPIN AND WRISTPIN BEARINGS.** Only filter-cleaned oil reaches bearing surfaces. Saves 50% to 75% of lubrication cost, and extends compressor life by reducing bearing and cylinder wear.
- **FORCED-DRAFT AIR COOLING.** Effectively cools the cylinder heads where greatest heat is generated, thus increasing efficiency. All cylinders are isolated for maximum heat radiation.

TYPICAL USES

Light sand blasting—cleaning boiler tubes—paint spraying—metal spraying—operating air tools and rock drills—semi-portable underground service—operating pressers — train charging—displacing acids and chemicals—stone cutting — general industrial service

WORTHINGTON

RADIAL AIR COMPRESSORS . . . . FOR AIR ANYWHERE

CAPACITIES: 83 TO 445 CU. FT. PER MIN. PRESSURES: 80 TO 125 LB. PER SQ. IN.

WORTHINGTON PUMP AND MACHINERY CORPORATION • HARRISON, NEW JERSEY

THIS *Fisher* LIBRARY *of* FOUNDRY EQUIPMENT INFORMATION

should be in your Files

EACH of these Bulletins represents years of equipment designing and building experience in a specific department of Light Metal Melting. Each piece of equipment presented is time-proved to equal all and extreme conditions. You may have any one of these Bulletins individually, or a complete file containing all of them in "Fisher Products for the Foundry," without obligation.

FISHER ENGINEERING SERVICE has proved invaluable to many Foundrymen in solving equipment problems and in the scientific coordination of equipment to specific plant and production conditions to provide maximum output. Before you expand, or otherwise alter your Light Metal production facilities—consult Fisher.

Write for your copy of these Bulletins Now!

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Stationary Crucible Melting Furnaces—gas and oil fired—Silicon Carbide Linings, Karmix Furnace Cement, Pumps, Gauges, Valves, Strainers and Tongs.

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Hand Operated Tilting Crucible Furnaces—gas or oil fired.

BULLETIN NO. 57
Motorized Nose Pour Crucible Furnaces—gas or oil fired.

BULLETIN NO. 300
Aluminum Melting Furnaces, stationary and tilting types—gas or oil fired.

BULLETIN NO. 101
Iron Pot Melting Furnaces—gas fired—actual performance figures, instructions for care of pots.

BULLETIN NO. 53
Combination Blowers and Oil Pump Systems, and Centrifugal Blowers.

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Industrial Burners, Proportional Gas or Oil Burner Assemblies, Metering Valves and Blast Gates.

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Motorized, hand tilting and stationary furnaces—gas or oil fired—Magnesium melting, holding and alloying—plant layouts, etc.

5519 N. WOLCOTT AVE., CHICAGO, ILLINOIS

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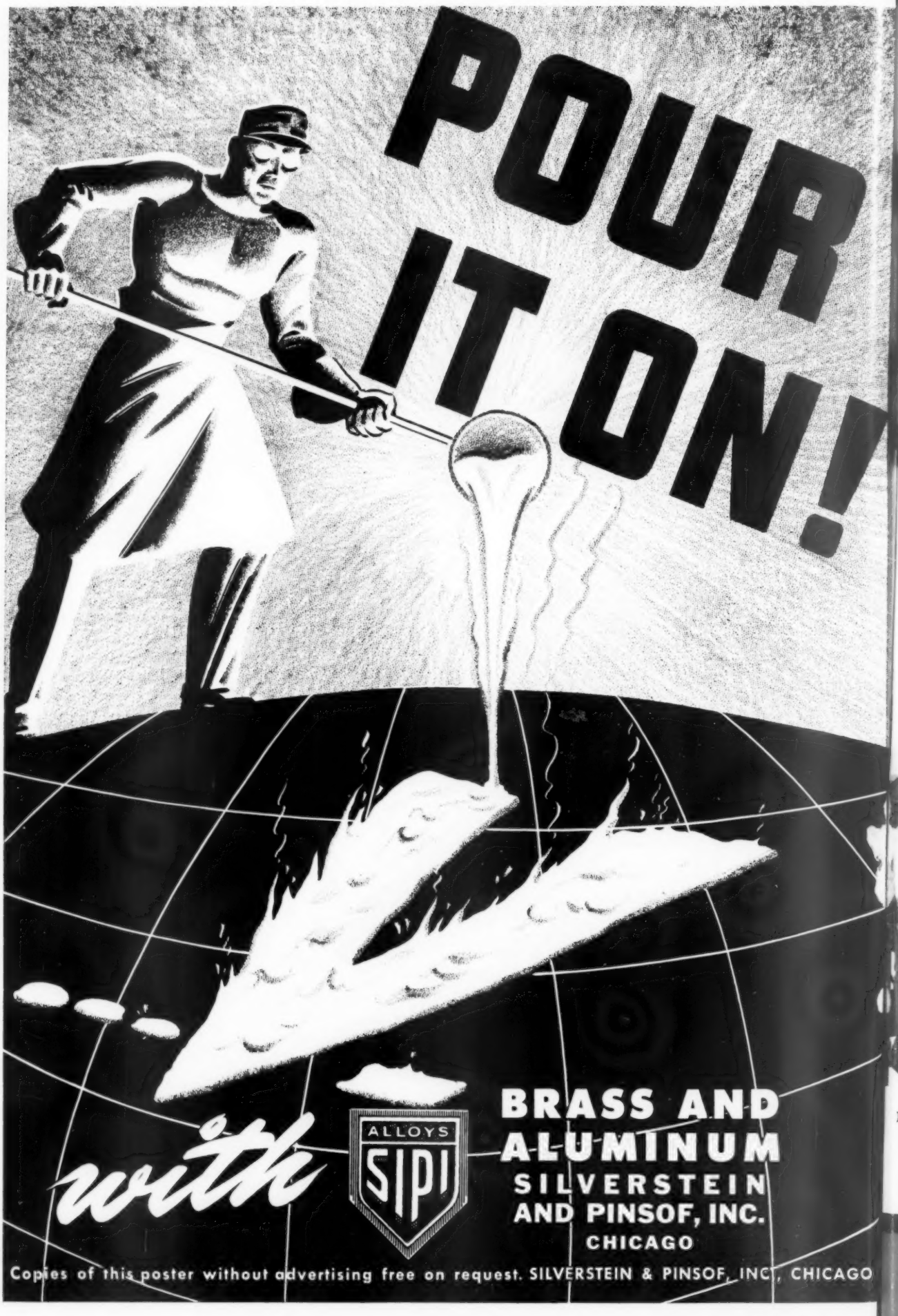
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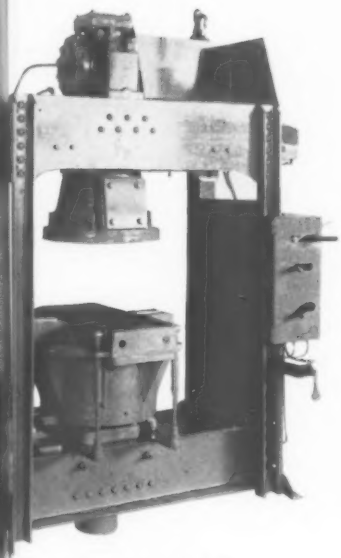
Copies of this poster without advertising free on request. SILVERSTEIN & PINSOF, INC., CHICAGO

CORE BLOWERS *Exclusively*



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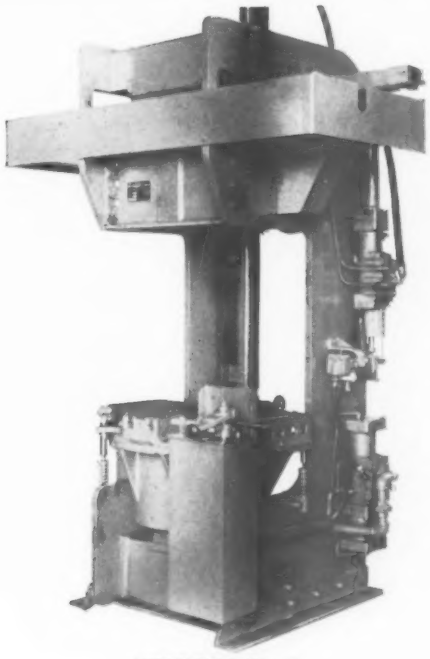

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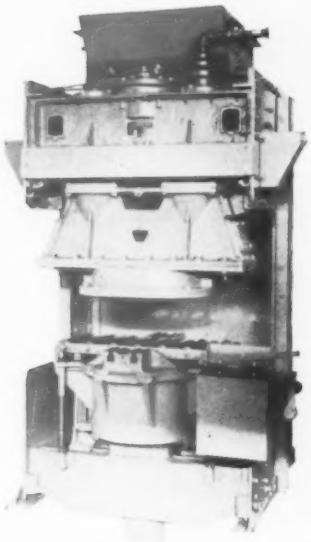
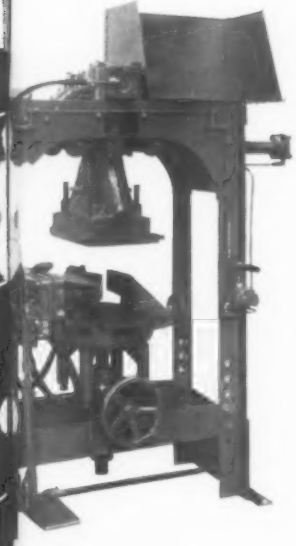


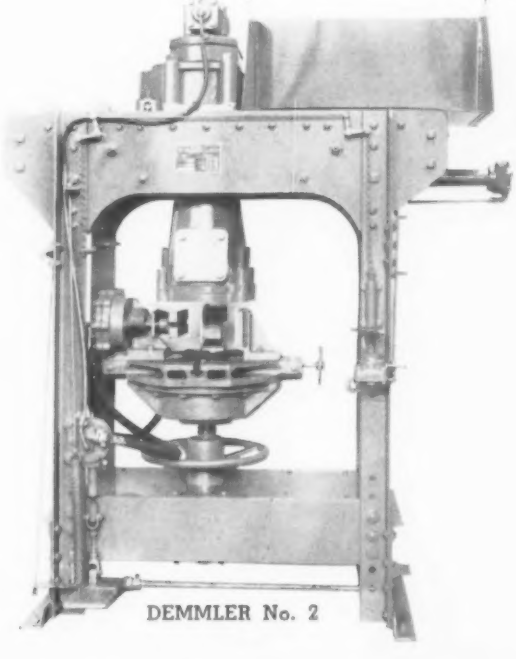
DEMMLER No. 5

Recent additions to our line are the No. 4E and No. 5 machines, designed for blowing cores for large airplane motor castings. Features include an accurate core box draw, table equipped with Timken rollers, control mechanism totally enclosed.

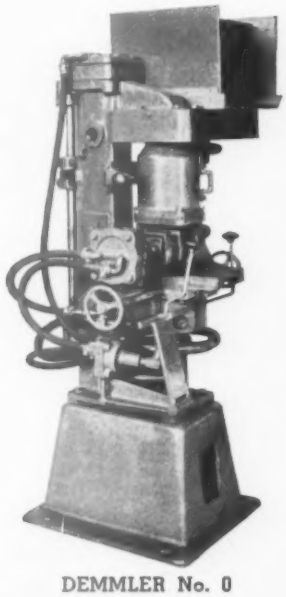
At this time we have capacity to make good deliveries, and suggest that you check with us on your anticipated requirements.



DEMMLER No. 1



DEMMLER No. 2



DEMMLER No. 0

WM. DEMMLER & BROS.
KEWANEE, ILLINOIS

DEMMLER

"Shake-out" dust nuisance eliminated by dust hood equipped with Bifurcators.

Removing heat and fumes from melting furnace. Note simplicity of installation.

Heat and fumes are removed from individually ventilated, crucible melting furnaces.

This VENTILATING UNIT installs in the duct

Any position from horizontal to vertical

YOU CAN INSTALL DeBothezat Bifurcators in any position from horizontal to vertical . . . and *right in the duct!* This feature *eliminates* elbows, bends and supporting platforms. Bifurcators are supported like any length of ordinary duct work. Extreme flexibility makes installation simple and inexpensive.

MOTOR IS ISOLATED FROM FUMES in a through-ventilated chamber. Motor is easily accessible for inspecting and servicing.

MOTOR IS PROTECTED against burning out by non-overloading power characteristic of the De-Bothezat Axial-Flow fan.

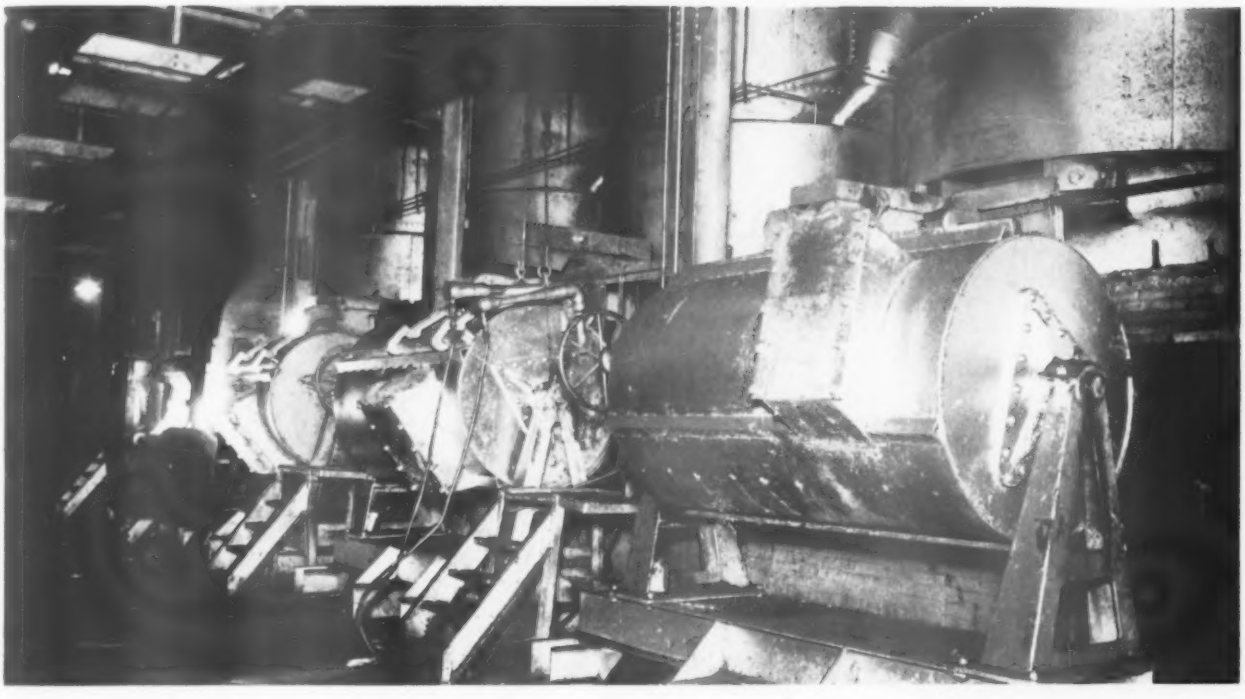
ARMY E NAVY

DeBothezat Bifurcators

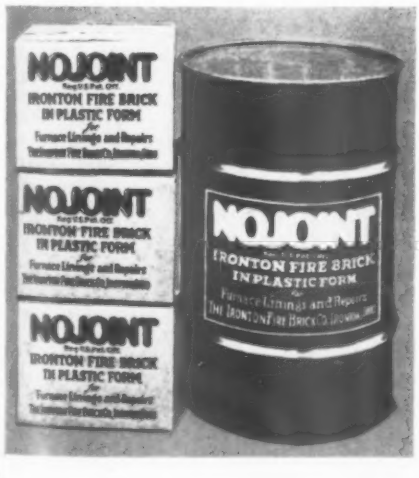
DE BOTHEZAT VENTILATING EQUIPMENT DIVISION

American Machine and Metals, Inc. ★ East Moline, Illinois

"IRONTON NOJOINT" for Foundry Ladles



Especially for RECEIVING, MIXING and DESULPHURIZING LADLES



Patching or re-lining particular ladles is a chore that requires special fire brick shapes—and an adequate inventory of special fire brick shapes requires constant checking. "IRONTON NOJOINT" MAKES PATCHING OR RE-LINING A SIMPLE OPERATION. "Ironton Nojoint" is manufactured especially for lining receiving, mixing and desulphurizing ladles where fused soda ash is being used. It provides a good, solid, monolithic lining which is very resistant to the corrosive action of soda slag. Because there are no joints, the lining doesn't wear out prematurely.

A few hours is all the time required to renew linings. When it is thoroughly dry, the ladle is again ready for service. Lining made of "Ironton Nojoint" does not soften, shrink, expand or spall, no matter how severe the service conditions.

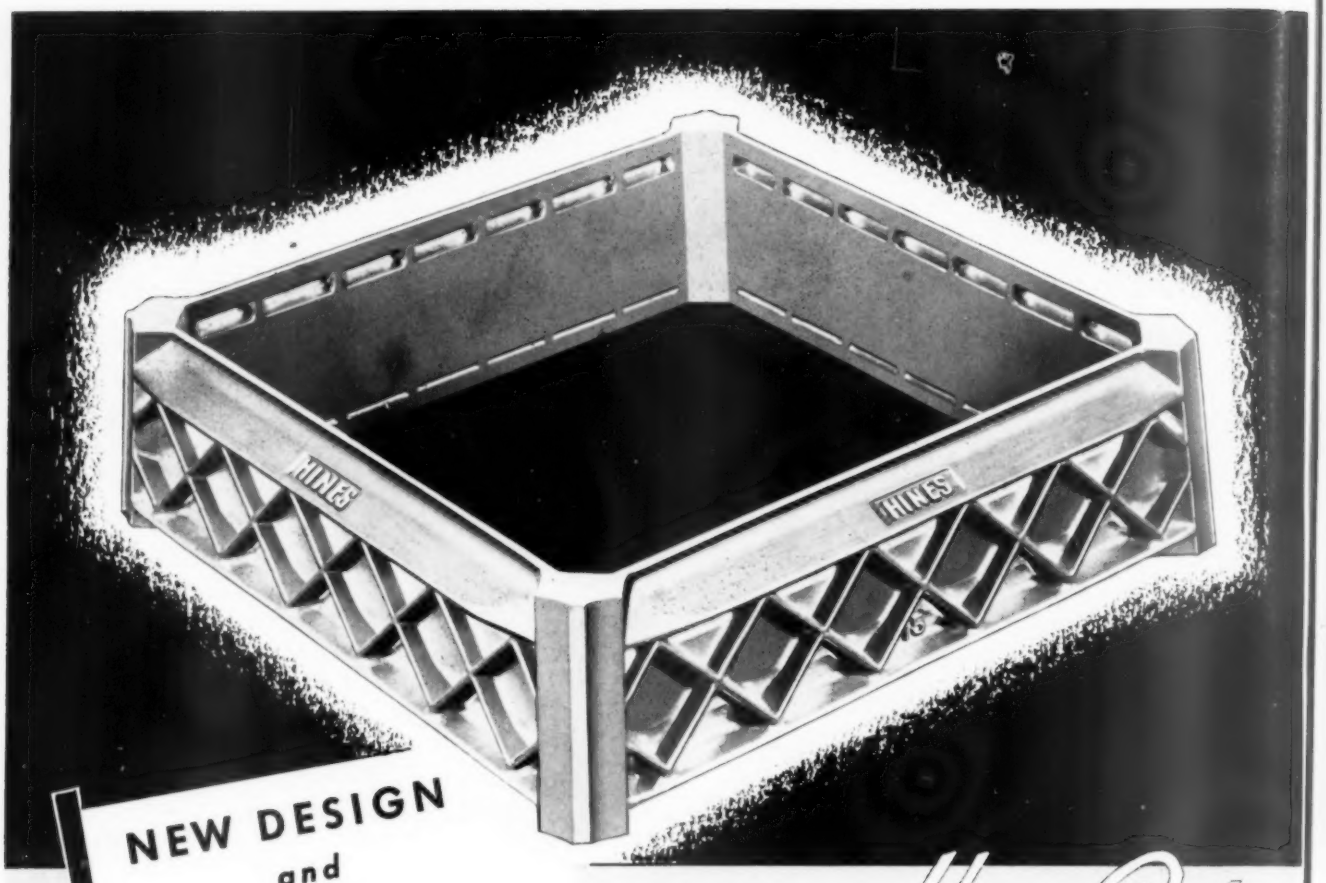
Shipped in steel drums or cartons in a plastic, ready-to-use condition. Write for new literature on this new lining.

Address Box 109

THE IRONTON FIRE BRICK COMPANY

RELIABLE REFRACTORIES

IRONTON OHIO



NEW DESIGN
and
HEAVY
CONSTRUCTION

FEATURE THIS *Heavy-Duty*

HINES JACKET

Here is a heavy duty iron jacket that will meet your every requirement and give you longer life and service than any other mold jacket.

It is designed to deflect hot metal, is heavily reinforced at the joint of the mold and is further strengthened by frequent diagonal ribs.

Following depths are carried in stock, 4½", 5½", 6", 6½", 7½", 8", 9½", 10". Other depths are available on special order.

MAKERS OF FOUNDRY FLASKS AND JACKETS Since 1919

HINES FLASK COMPANY

Phone ACademy 1480

1324 HIRD AVENUE • CLEVELAND, OHIO

Mighty Midgets

ABRASIVE COMPANY

MOUNTED WHEELS AND MOUNTED POINTS

They're little, yes—but mighty important to the metal-working industries engaged in making Uncle Sam's war equipment.

ABRASIVE Mounted Wheels and Points perform many thousands of intricate and difficult precision grinding jobs in war plant tool rooms and on production lines . . . for die grinding on alloy and hardened steels, for burring and "breaking edges" on precision ground mechanical parts, for cleaning out stock and for grinding out those "hard-to-get-at" places so frequently encountered.

Airplane engines, gun mechanisms, tank parts, shells and bomb parts are regularly being ground at various stages throughout their manufacture with ABRASIVE Mounted Wheels and Points. Expert skill and experience in making abrasive materials and bonded abrasive products for over fifty years permit us to offer war manufacturing industries a complete line of all sizes, shapes and specifications of mounted wheels and mounted points of the highest quality.

Special types of abrasives, bonds and manufacturing facilities give ABRASIVE Mounted Wheels and Points a fast, cool cutting-action, long useful life and a high degree of mechanical accuracy. Try them on your work, now—both in the tool room and for production. Your inquiry will bring complete details.

ABRASIVE COMPANY

DIVISION OF SIMONDS SAW AND STEEL CO.

TACONY & FRALEY STS., PHILADELPHIA, PA. • CHICAGO BRANCH: 127 SOUTH GREEN ST.

DISTRIBUTORS IN ALL PRINCIPAL CITIES

TO HIT 'EM H-A-R-D-E-R

THE year 1943 promises to be the grimmest, hardest year this country has ever faced. Every effort, and every dollar of national income not absolutely needed for existence, should go into war work and War Bonds.

In the Pay Roll Savings Plan, America finds a potent weapon for the winning of the war—and one of the soundest guarantees of the preservation of the American way of life!

Today about 30,000,000 wage earners, in 175,000 plants, are buying War Bonds at the rate of nearly half a billion dollars a month. *Great as this sum is, it is not enough!* For the more dollars made available now, the fewer the lives laid down on the bloody roads to Berlin and Tokio!

You've undoubtedly got a Pay Roll Savings Plan in your own plant. But how long is it since you last checked up on its progress? *If it now shows only about 10% of the gross payroll going into War Bonds, it needs jacking up!*

This is a *continuing* effort—and it needs *continual* attention and *continual* stimulation to get fullest results.

You can well afford to give this matter your close personal attention! The actual case histories of thousands of plants prove that the successful working out of a Pay Roll Savings Plan gives labor and management a common interest that almost inevitably results in better mutual understanding and better labor relations.

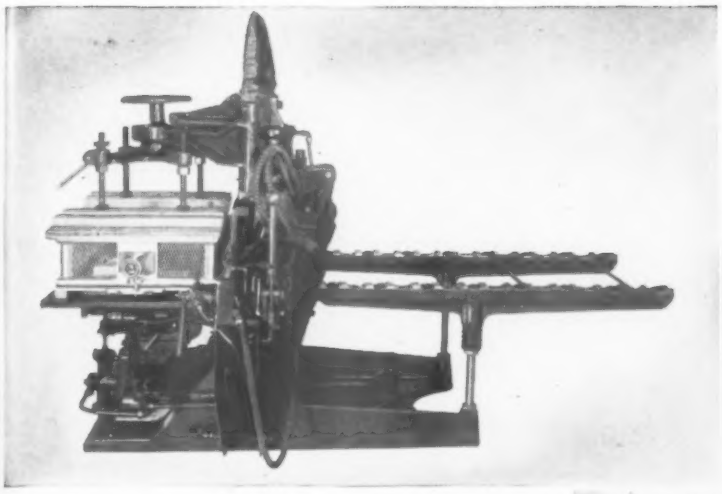
Minor misunderstandings and wage disputes become fewer. Production usually increases, and company spirit soars. And it goes without saying that workers with substantial savings are usually far more satisfied and more dependable.

And one thing more, these War Bonds are not only going to help win the war, they are also going to do much to close the dangerous inflationary gap, and help prevent post-war depression. The time and effort *you* now put in in selling War Bonds and teaching your workers to save, rather than to spend, will be richly repaid many times over—now and when the war is won.

★ ★ ★

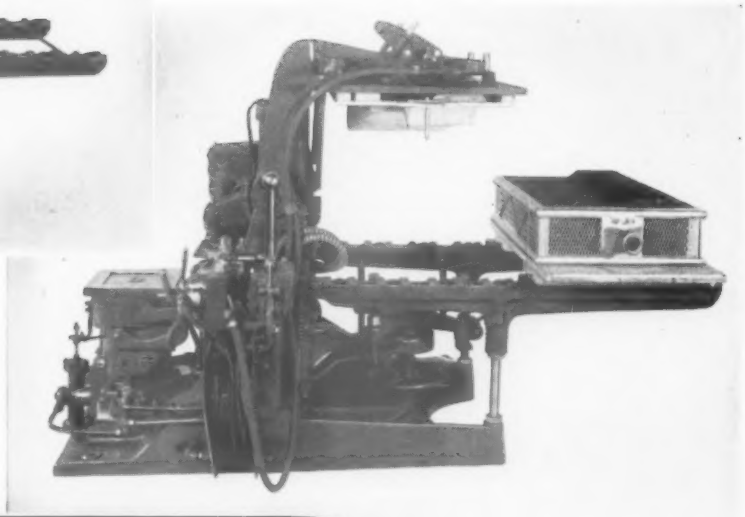
You've done your bit Now do your best!

This space is a contribution to victory today and sound business tomorrow by THE FOUNDRY



Above—View of No. 815 Jolt, Roll-Over Pattern Draw Machine Clamped, Equalized, and ready for Roll-Over Operation.

At Right—View of same Machine after Rolling Over, Showing Perfect Pattern Draw.



A FAST HIGH PRODUCTION JOLT, ROLL-OVER PATTERN DRAW MACHINE FURNISHED IN THREE SIZES

• Johnston-Jennings Jolt Roll-Over Pattern Draw Machines meet every requirement for fast, easy, efficient work. They assure maximum production even with relatively unskilled operators,—and are standard equipment in most large aluminum and magnesium foundries. These machines are built in three sizes and require no pits. They are of open end construction and incorporate many design and operating refinements much appreciated by practical operating men. Our fully descriptive catalog giving complete details of this and other Johnston & Jennings molding machines furnished gladly on request — No obligation — Send for a copy today.

A COMPLETE LINE PROVEN IN SERVICE INCLUDING—

PLAIN AIR JOLTS
in 12 different sizes

JOLT SQUEEZERS
fast sturdy machines—3 sizes

JOLT STRIPPING PLATES
4 sizes ranging up to 16" draw

JOLT, SQUEEZE, STRIPPING PLATE AND PATTERN DRAWS
Popular for medium service —2 sizes

PORTABLE JOLT ROLL-OVER AND PATTERN DRAW
A heavy duty thoroughly dependable machine—portable

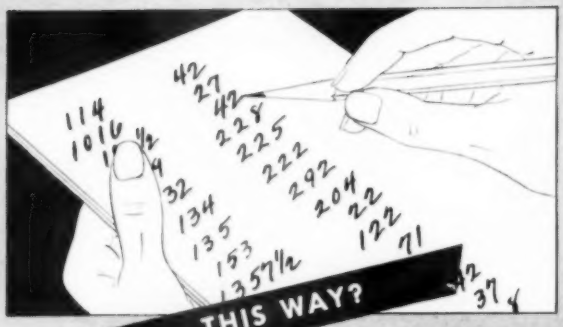
JOLT ROLL-OVER AND PATTERN DRAWS
Fast large capacity machines with roll-out conveyors—4 sizes

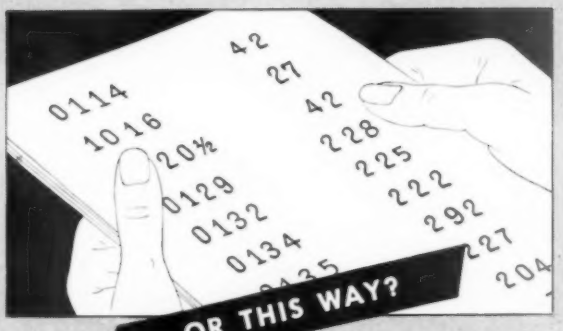
Write for fully descriptive catalog giving complete specifications.

THE JOHNSTON & JENNINGS CO.

867 ADDISON ROAD • CLEVELAND, OHIO

How Are Weight Records Made In Your Plant—





For precision weighing and precision recording use *FAIRBANKS SCALES* with *PRINTOMATICS*

● Of course, *sustained accuracy* in the weighing machine is vitally important. But no matter how accurate the machine is, unless weights are *accurately recorded,* the element of error still remains.

Fairbanks Scales with Printomatics eliminate these human errors—because the scales read the weight automatically and then automatically make a *printed* record of the weight. In addition to eliminating errors, Fairbanks Scales can be fitted into your production flow to do a variety of jobs better than they can be done in any other way. Fairbanks Scales weigh loads in motion . . . count small parts . . . record the flow of liquid chemicals . . . guard secret formulas in compounding . . . control batching . . . automatically control ingredients . . . automatically control aggregates . . . and many other jobs.

The organization which made Fairbanks the greatest name in weighing brings you 113 years of scale manufacturing experience. That, too, is worth serious consideration.

Fairbanks, Morse & Co., 600 S. Michigan Avenue, Chicago, Illinois.

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PUMPS
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RAILROAD EQUIPMENT

Scales

Suit Yourself with TAILORMADE STEEL

PATTERN PLATES
CORE PLATES
BOTTOM PLATES

Our Flattened Steel pattern plates, core plates and bottom plates in many cases are tailormade to suit your particular foundry requirements.

We cut the raw material of proper thickness and flatten it to a straight-edge. Rolling strains are relieved and plates are *permanently* straightened.

We are prepared to make our Steel plates to order in any size, shape or thickness, promptly May we hear from you?

MOLTRUP·STEEL·PRODUCTS·CO.

BEAVER FALLS, PA. | PITTSBURGH DISTRICT

METALLURGICAL TESTING EQUIPMENT

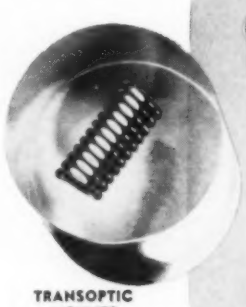
Especially designed and engineered for the rapid, precision, testing of metals

NEW SPECIMEN MOUNT PRESS—Designed to provide the utmost in ease and speed of making transoptic mounts. Constructed with a rugged simplicity that will give long service and precision built for accuracy. The molding tools are lapped finished for close tolerance with a perfect fit. Either 1″ or 1¼″ molds may be used with ease on the AB presses.

The new design retains the solid heater which brings the mold to top temperature faster; however, on the new model, it is not necessary to release the pressure before cooling the sample. This is accomplished by sliding the heater up the mold onto a holder pin and swinging a pair of finned cooling blocks into position, where they are held by a locking lever. The heater and cooling blocks need not be removed from the press. This keeps them out of the way and prevents accidental burns.

AB STANDARD POLISHERS—The sturdy construction and vibrationless operation makes the AB polisher cover a wide range of usefulness in the metallurgical laboratory. Maximum convenience and comfort in operation is attained by exclusive features such as the removable splash ring that serves as a hand rest, and the mounting of the polishing disc that is keyed to a tapered arbor on the motor by means of a stout sleeve. This reduces peripheral vibration to a minimum. The polishing disc is 8″ in diameter to accommodate large specimens and gives increased peripheral speed. The disc is equipped with a new type cloth clamp for quick changing.

AB Specimen Mounting Press No. 1315

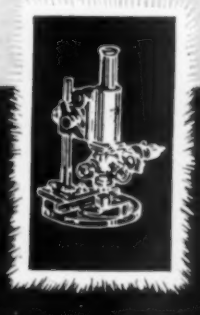


TRANSOPTIC MOUNTS provide circumambient visibility of specimen

AB Standard Polisher No. 1500

A complete line of equipment for the Metallurgical Laboratory . . . . .

SPECIMEN MOUNT PRESSES—POLISHERS—POLISHING ABRASIVES—POLISHING CLOTHS—POWER GRINDERS BELT SURFACERS—CUT-OFF MACHINES—HAND GRINDERS—CARBON METERS—COLORIMETERS—HARDNESS TESTERS—DILATOMETERS—DUST COUNTERS—EMERY PAPER GRINDERS—LABORATORY CHAIRS—TITRATORS MAGNIFIERS — METALLOGRAPHS — MICROSCOPES — STEREOSCOPES PYROMETERS—REFRACTOMETERS—SPECTROGRAPHS—MACRO CAMERAS



Adolph I. Buehler

OPTICAL INSTRUMENTS ★ METALLURGICAL APPARATUS

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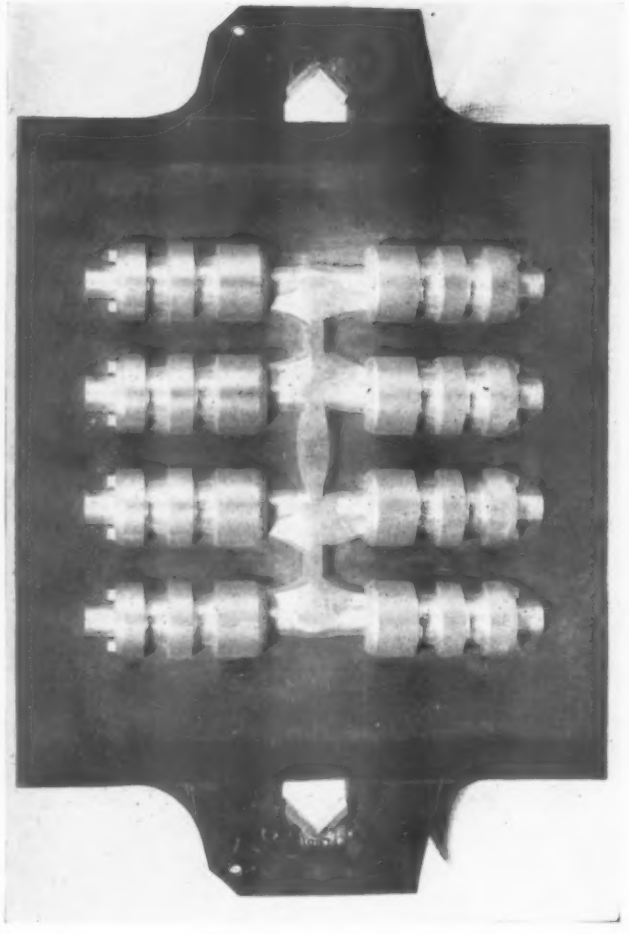

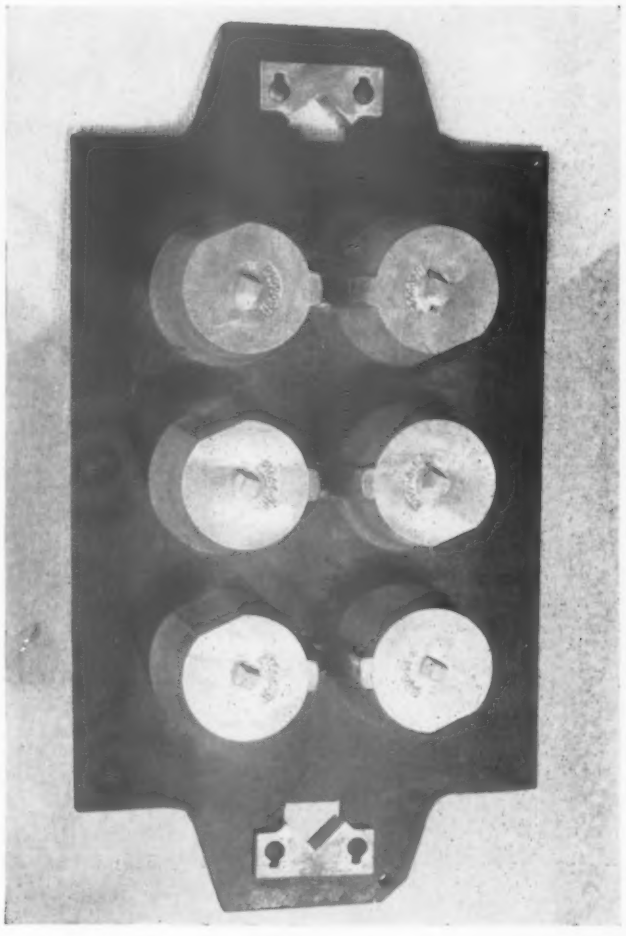

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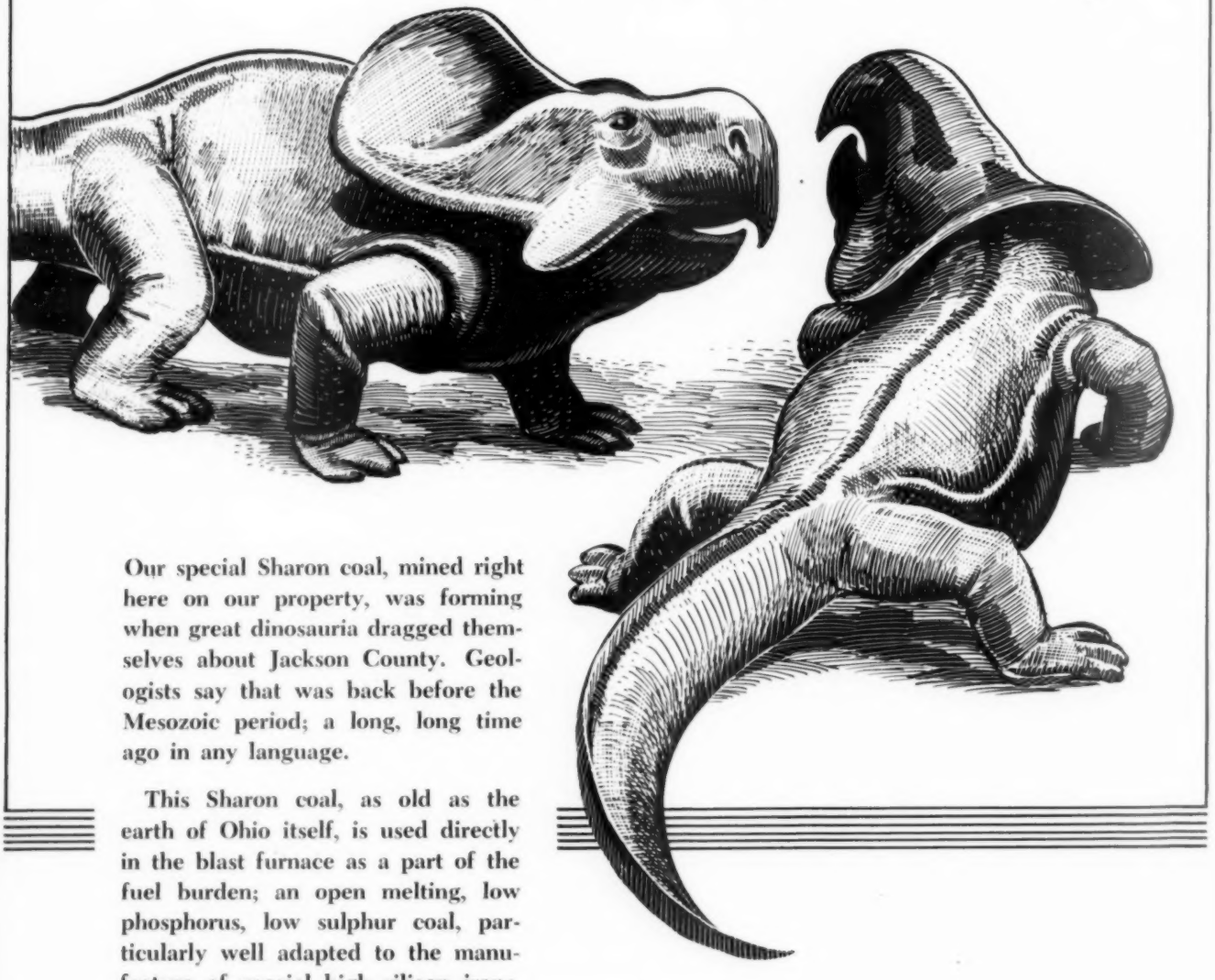
1,000,000 years ago Globe Iron was in the making



Our special Sharon coal, mined right here on our property, was forming when great dinosauria dragged themselves about Jackson County. Geologists say that was back before the Mesozoic period; a long, long time ago in any language.

This Sharon coal, as old as the earth of Ohio itself, is used directly in the blast furnace as a part of the fuel burden; an open melting, low phosphorus, low sulphur coal, particularly well adapted to the manufacture of special high silicon irons. This coal imparts to the iron a quality that cannot be accomplished by any other grade of coal known.

GLOBE IRONS are made as carefully as a pharmacist compounds a prescription. At a time when "quantity" is a watchword, "quality" stands out like a beacon light. And GLOBE IRONS are the last word in quality iron.

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To get increased production . . . faster melting . . . speedier handling . . . alloys of uniform analysis . . . minimum spilling waste . . . continuous trouble-free operation . . . longest life . . . utmost fuel economy . . . use STROMAN CRUCIBLE MELTING FURNACES.

Incorporating many new and exclusive features including the famous STROMAN STATIONARY LIP POUR which eliminates ladle shifting during the pouring operation, these furnaces are indeed the foundryman's answer . . . solving the question of ever increasing all out war production.

COMPLETE AUTOMATIC TILTING is entirely controlled, simply, safely, and correctly by the mere touch of a fingertip. Correct temperatures are attained quickly and maintained indefinitely. Available with either oil or gas fire. Capacities: 350 to 2000 pounds of magnesium or equivalent weights in aluminum.

THE COMPLETE STROMAN LINE

includes the most advanced furnaces for melting Brass, Bronze, Magnesium, Aluminum, and all other types of non-ferrous metals.

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STROMAN STATIONARY HOLDING UNITS
for magnesium are built in sizes from 90 to 550 lbs. Oil or Gas fired.

Cap. 550 lbs. magnesium Cap. 350 lbs. magnesium Cap. 200 lbs. magnesium

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A HERMAN TO MEET EVERY MOLDING REQUIREMENTRE

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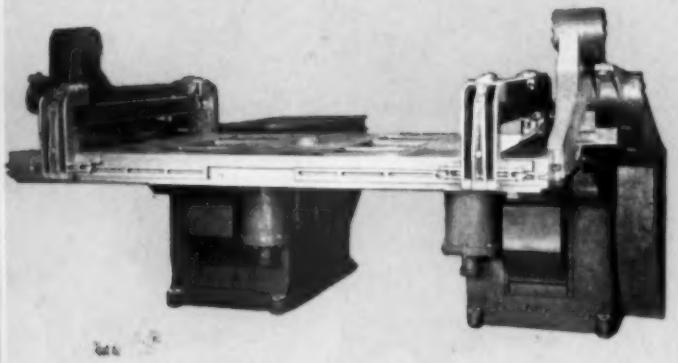

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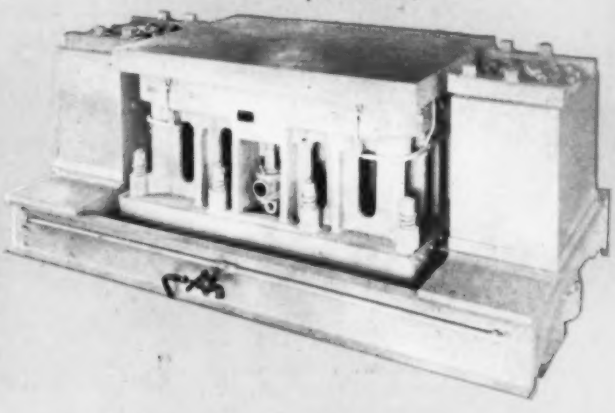

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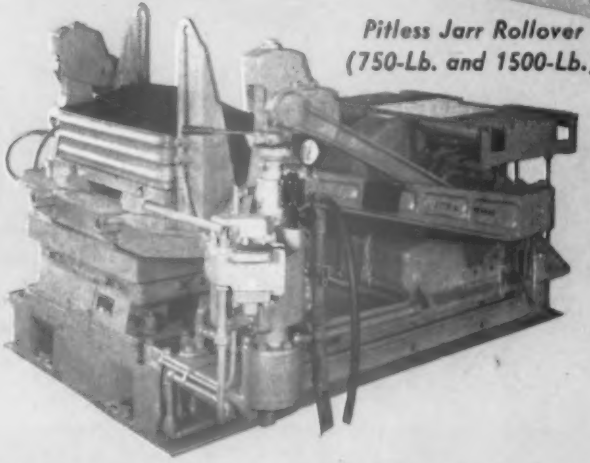

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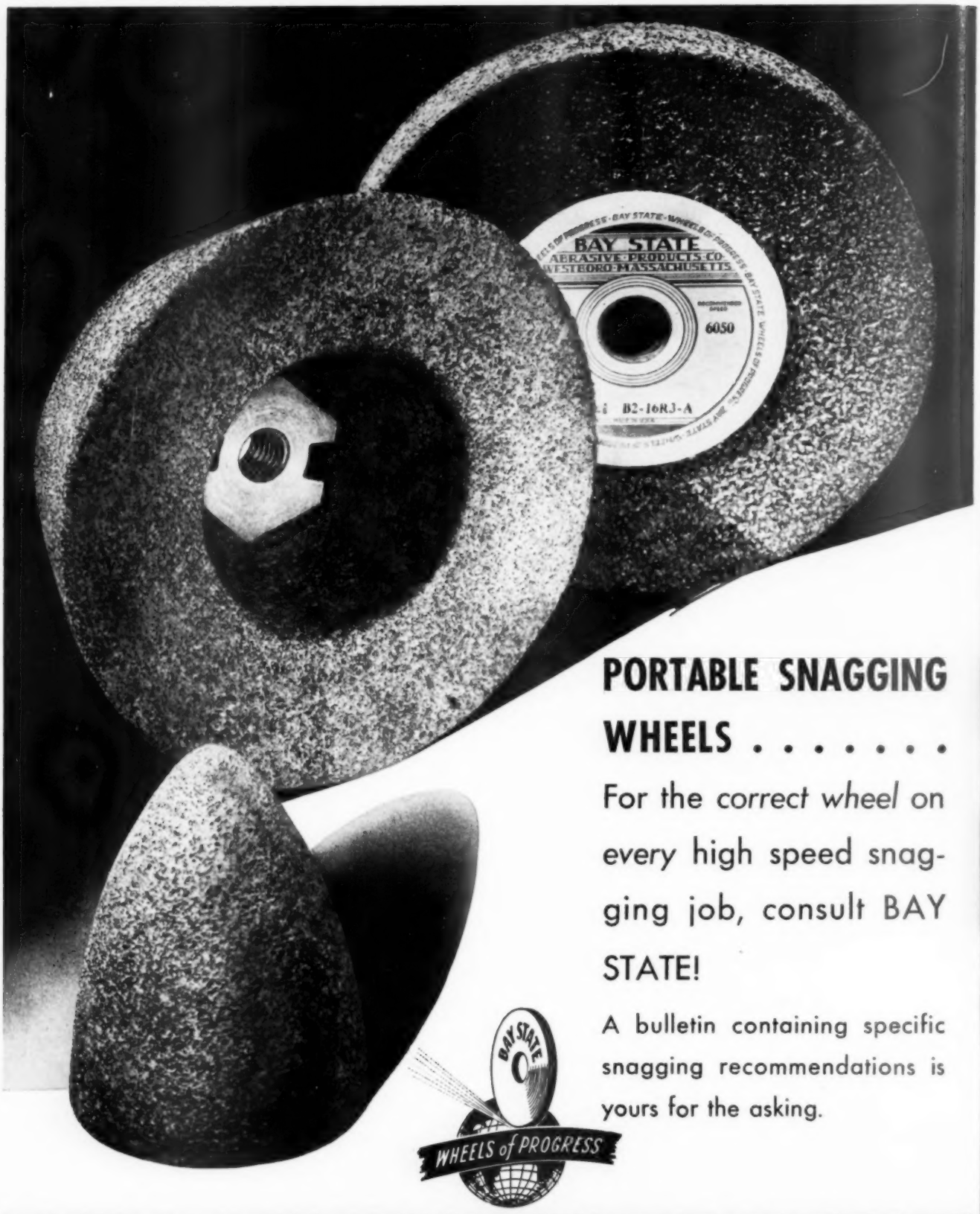

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at the world's largest
Non-Ferrous Jobbing Foundries!

Right — 8 of 12 ovens at Howard. Two racks in each compartment — 24 racks in all. One gas fired Maehler air heater for each double oven. L & N and Wheelco controls and automatic dampers (a new Maehler development) for each heater.

Below—All ovens equipped with lift doors and Maehler type safety latches.

100% Maehler Core Ovens
at Three Howard Foundries

Maehler re-circulating air heat core ovens are standard in Howard's three plants—the magnesium and aluminum foundries in Chicago and the bronze foundry at Aurora, Illinois.

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Approximately 90% of Maehler's production is devoted to filling *repeat* orders for core ovens and heat treating furnaces—mute testimony to customer satisfaction. If you need ovens or furnaces, here is your best guide to a source of supply.

TWO aging ovens, one cabinet type core oven and twelve rack type core ovens—that's the Maehler installation at the Howard magnesium foundry in Chicago, making a total of 19 Maehler Ovens at all Howard plants. At full capacity this plant will be the largest magnesium sand casting foundry in the United States—and probably largest in the entire world! It's another American wartime industrial triumph, in which Maehler is proud to have played an important role.

In leading foundries throughout the country, you'll find Maehler ovens producing better, more evenly baked cores—faster—at less cost.

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The PAUL MAEHLER CO.
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NORTON Refractory Cements

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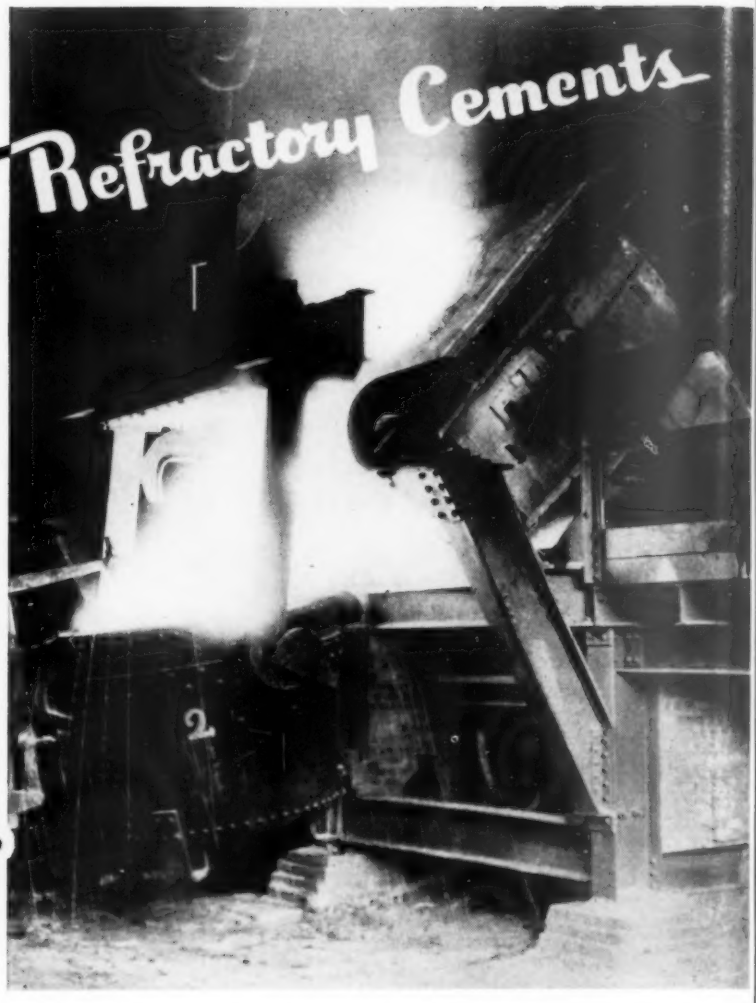

ALUMINUM

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RC 1131 CEMENT — a Crystolon (silicon carbide) cement of very high refractoriness for ramming into oil or gas fired reverberatory and pit furnaces melting aluminum. Also recommended for melting copper and zinc.

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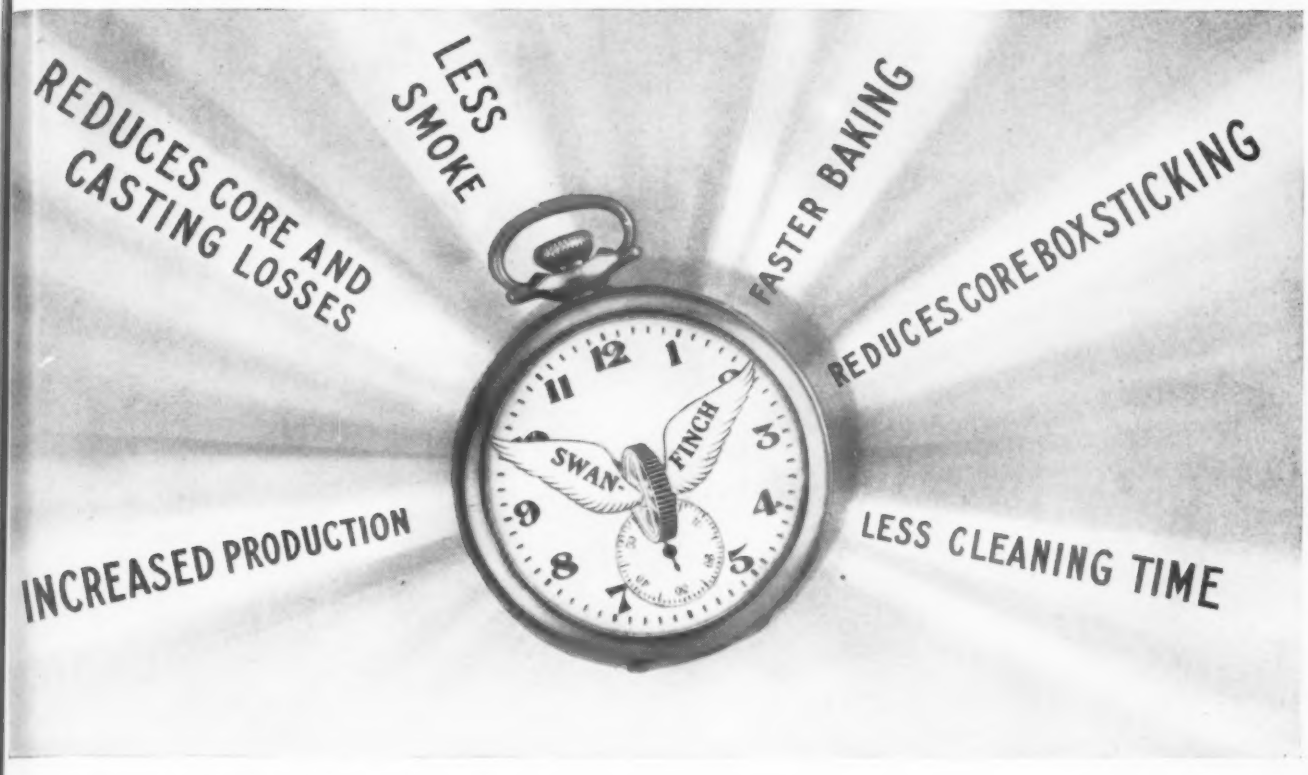
RM 1140 CEMENT — a fused magnesia cement for rammed linings in Ajax-Wyatt low frequency vertical ring induction furnaces melting high copper alloys (more than 85% copper), copper-nickel alloys, nickel silver, and cadmium bronzes. Successfully used by America's largest copper and brass melters.

NORTON COMPANY, Worcester, Mass.

NORTON ELECTRIC FURNACE FUSED REFRACTORIES



SAFCO CORE OILS

are proved time-savers!

Over and over again it is being proved on the job that 'SAFCO' core oils are time-savers — — — increasers of production.

Hundreds of reports from foundries, (many outstanding leaders in vital war production), *prove* that 'SAFCO' can bring amazing increases in production.

For over 30 years, SWAN-FINCH, makers of 'SAFCO' products, have been leaders in the highly specialized field of core oil manufacture.

Today as never before our specialized experience is proving its value in helping foundries meet increased production schedules.

It will pay you real dividends to get better acquainted with the Swan-Finch field representative who covers your district. Capable and able, they are constantly devising *new* ways and means for stepping up production.

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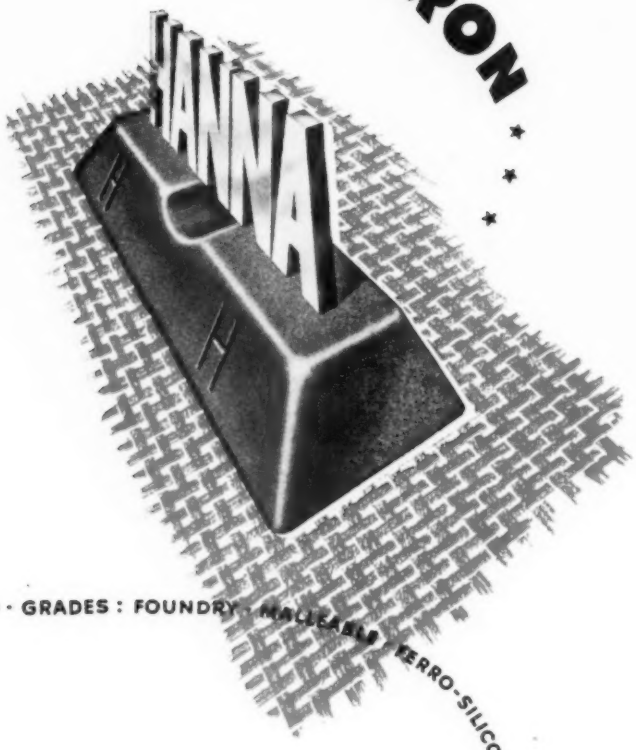
Detroit, Mich.	2596 Hart Avenue	Detroit, Mich.	2596 Hart Avenue

. . . THE BEST KNOWN NAME IN IRON . . .



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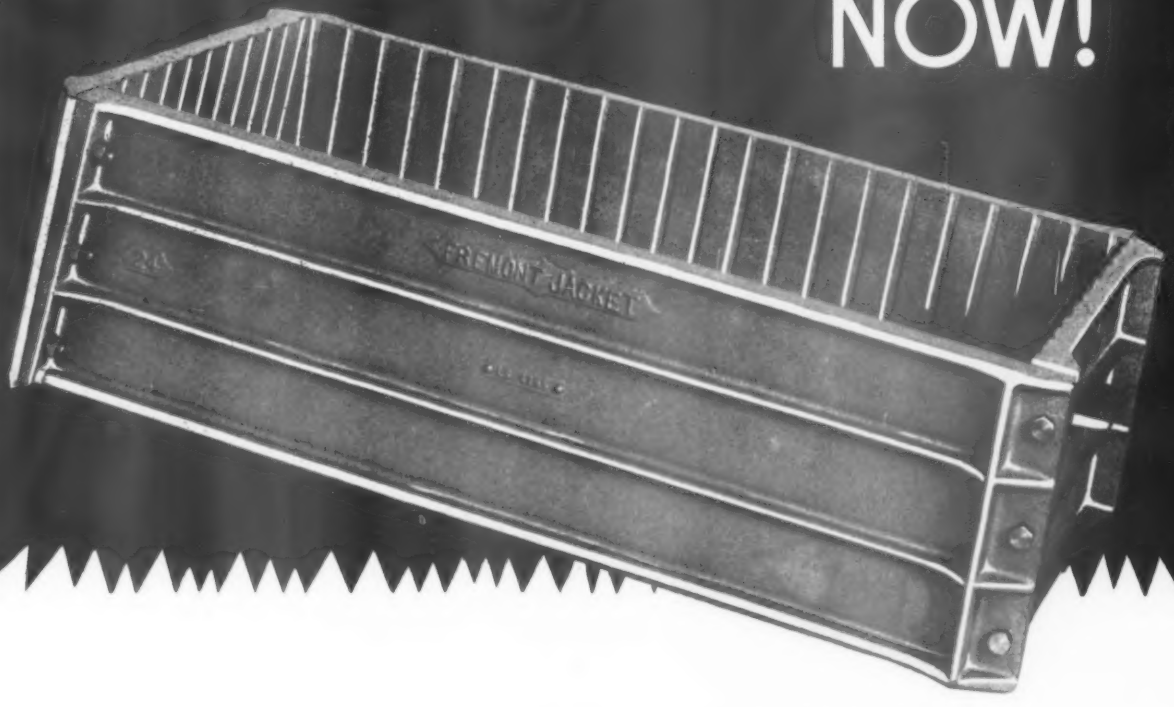

Slip flasks and jackets underwent no great change during hundreds of years. Rough wooden boxes served without much improvement for so long that many foundrymen overlooked the possibility that slip flasks or jackets *could* be improved; they were more or less taken for granted. It is true that in time of war inventive genius is greatly stimulated. The FREMONT JACKET, for example, was especially ribbed to permit gas to escape from the mold. Moreover, all JACKET corners are machined and drilled to precision with a jig. These two improvements alone shape the future trend of foundry flasks and jackets. Standard jackets are furnished with or without ribs. "Ribbed jackets" should be specified when ordered.

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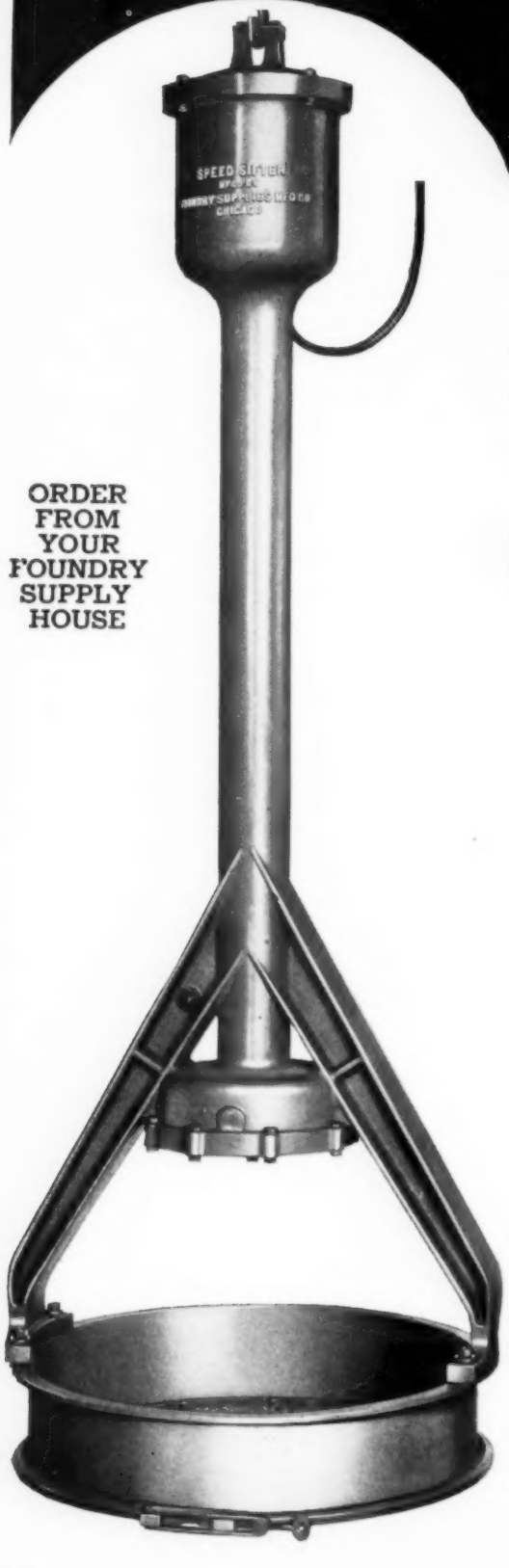
"Hard-to-Please" Foundries Standardize on Rotoplane!



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Try ROTOPLANE in your plant. You, too, will find it increases production, does *all* your sifting more quickly and economically. One size and type for all sifting jobs.

ROTOPLANE is built for long, dependable service. Strong, one-piece frame gives remarkably effective vibration. Smooth, free, rotary action. All mechanism completely enclosed and dustproof. Weight approx. 90 lbs., 62 in. high overall.

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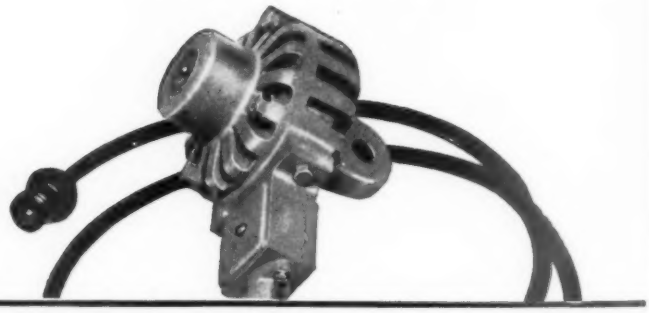

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True-to-pattern castings make satisfied customers . . . more repeat business. Increase your production and castings quality with RED Electric Vibrators. Sturdy, dustproof, lowest operating cost (electricity does not freeze). Unequaled for consistent year-'round results in foundries all over the world.

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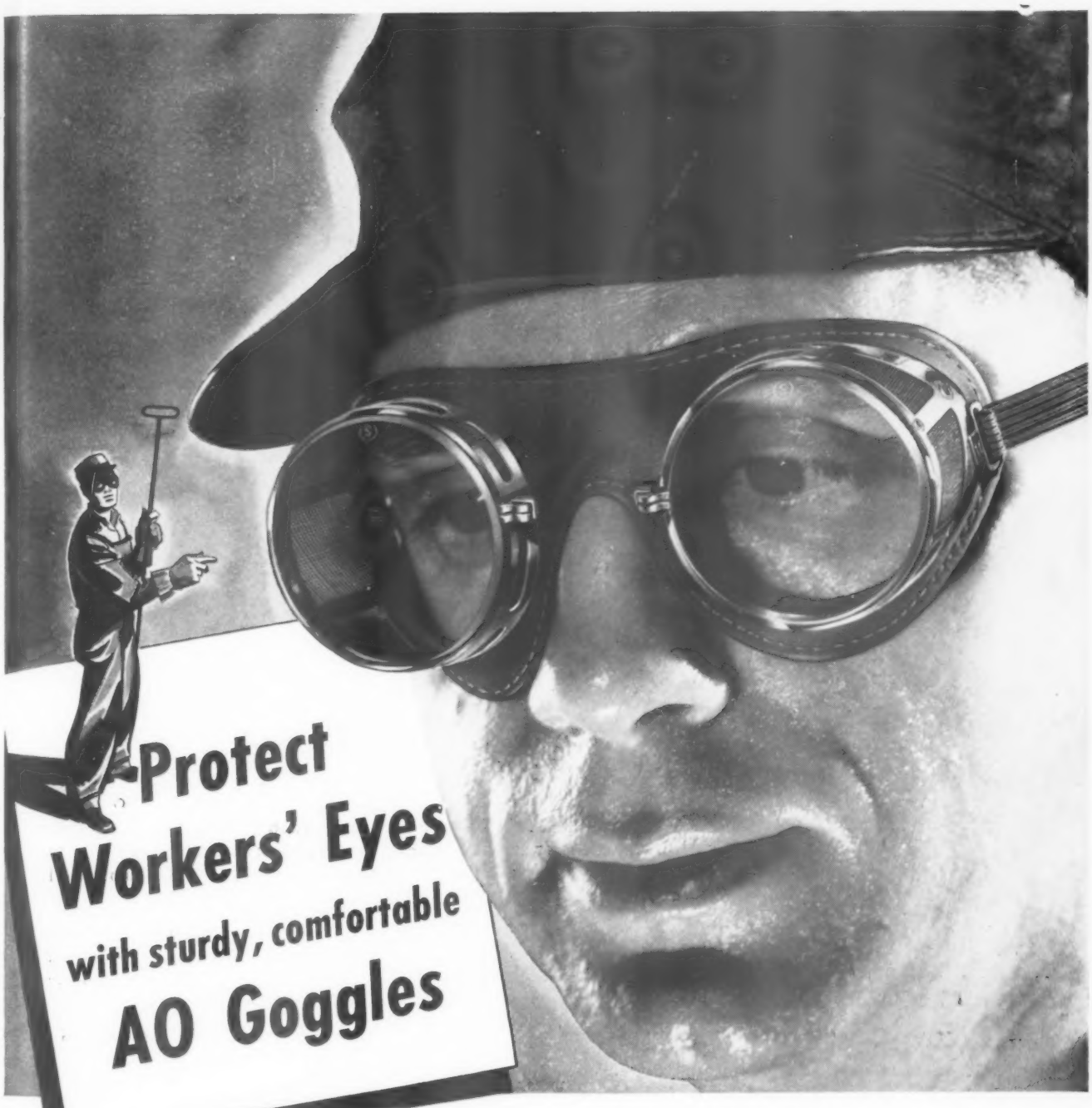

N.F.A. and N.A.S.O. Goggles, made by American Optical Company and supplied directly to you, offer maximum possible impact-resistance . . . and they're comfortable to wear.

These safety goggles, designed especially for foundrymen, have Super Armorplate Lenses . . . available in either clear glass or glare-resistant Calobar.

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Aluminum and Brass FLUXES

Famous CORNELL ALUMINUM FLUX permits the use of more scrap and produces castings free from spongy and porous spots. It emits no obnoxious odors.

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Manufacturers of Iron, Brass and Aluminum Flux Since 1917

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Powerful Picker Mobile X-ray Unit is ideal for X-ray Inspection of many metal parts at point of production . . .

Picker Industrial Mobile and Stationery X-Ray Equipment fulfills every requirement for production inspection, or spot checking of castings, forgings, welds and spot welds, finished parts or assemblies.

Picker Mobile units have a range of 15,000 volts to 150,000 volts. This provides for radiographing spot welds of thin aluminum sections and up to 6 inches of aluminum, or 1½ inches of steel. Write today for complete details of this unusual x-ray equipment.

Compact, powerful and easily transported on air cushioned rubber-tired wheels, the Picker 150 KV. Mobile Industrial X-Ray Unit is ideally adapted for X-Ray inspection of metal parts at any point of production within the plant, a definite savings in man hours.

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Production on Schedule with

Adams Jolt Squeezers

Industry is being forced to reconcile a demand for all-out production with a rapidly diminishing skilled labor market.

YOU WILL HAVE TO PRODUCE MORE WITH LESS!

This calls for the fullest exercise of American ingenuity and the intelligent use of the most modern labor-saving equipment that is available.

Adams Molding Machines will help you. Their simple design and the convenience of operating controls eliminate the need for skilled help and assure continuous and dependable performance.

Made in Side Rod Type and Post Type . . . Jolt-Squeeze and Jolt-Squeeze-Pattern-Draw . . . Portable and Stationary . . . in sizes that cover the entire range of squeezer molding.

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1883 — *Our 60th Year* — 1943

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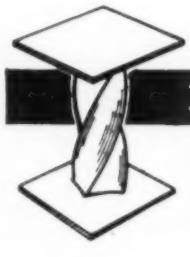
THE ONE CHAPLET
. . . that has everything!

PROMPT DELIVERY

The Twist does the Trick!

THE FEDERAL TWISTED STEM CHAPLET



1. FOUR FUSION EDGES

• Four sharp edges for fusion—not just in one spot, but the entire length of the stem!

3. NO GAS TRAPS

• The smooth surfaces of the stem have no deformations to trap gases and cause blows.

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• The twisted square stem is not deformed . . . full strength from head to head offers maximum core support.

4. A COMPLETE LINE

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Samples (of your own size) Gladly Submitted

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For Every Industrial Heat Treating Process

EF gas fired hearth type annealing furnace.

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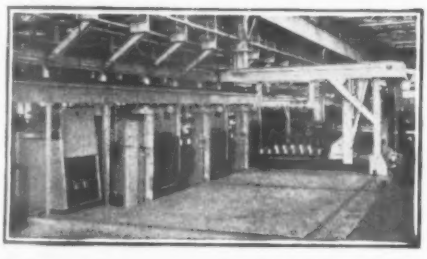

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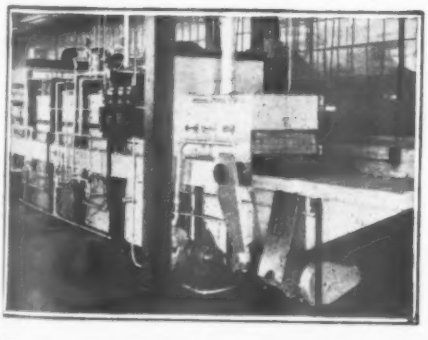

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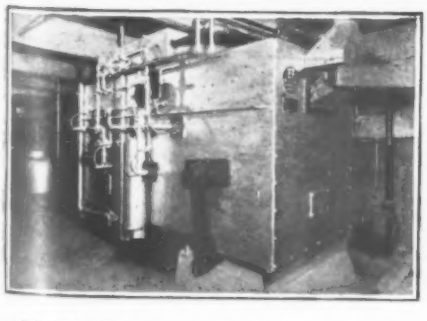
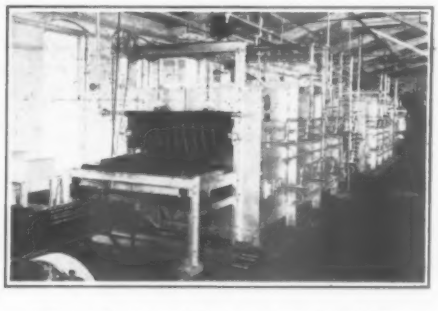


EF special atmosphere furnace scale free heat treating miscellaneous small parts—continuously



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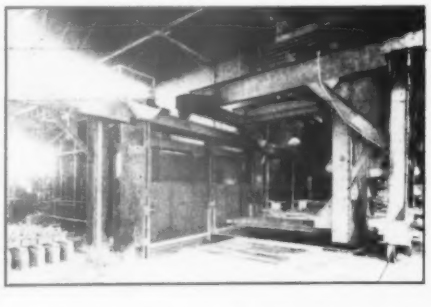

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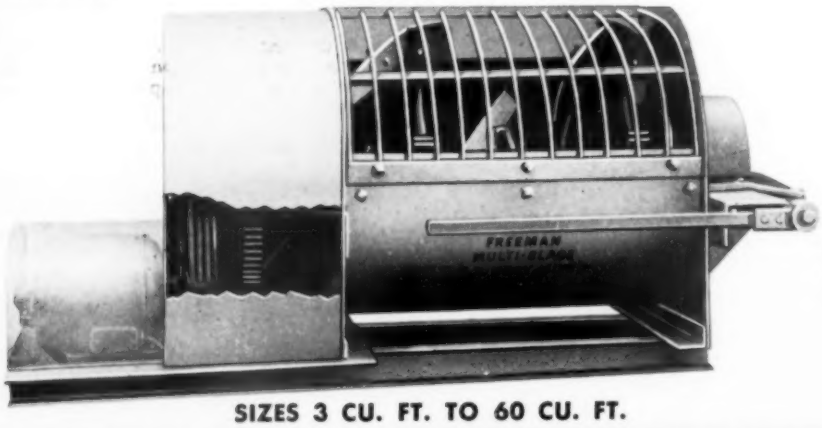

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TOLEDO, OHIO

Malleable Industry Has Co-operated Fully With War Production Program

SEVERE criticism of the malleable foundry industry in its relation to the war effort is contained in an address by Col. Merle H. Davis, district chief, St. Louis Ordnance District, before the opening meeting of the War Production Foundry Congress staged recently in St. Louis by the American Foundrymen's Association. Colonel Davis charges lack of aggressiveness on the part of malleable foundrymen in going after ordnance business, and that many of the malleable castings supplied to arsenals and prime contractors recently have been bad castings. Believing that both of these charges are not true, and that therefore, every foundryman should be familiar with the various phases of the controversy, THE FOUNDRY is presenting the paper by Colonel Davis on page 129 and a statement of the Malleable Founders' Society on page 143 of this issue.

Any reticence on the part of malleable foundrymen to apply malleable castings to the war effort evaporated as the present emergency developed. Months before Pearl Harbor, the organized trade group of the industry, through its engineer, undertook to show the Ordnance Department and other War agencies how components, then being made of most critical parts, could be converted to malleable castings and still meet all of the requirements of service. At the same time, malleable foundrymen, in groups and as individuals, visited Washington in an effort to further the use of malleable iron in the war effort. These men found that while the Ordnance Department was using steel castings in tremendous quantities, other types of ferrous castings were not looked upon with particular favor, and inertia toward change was great.

Declaration of war accelerated the work of the society representatives, both in Washington and at the various arsenals. At the same time, many malleable foundrymen worked with district ordnance offices in an effort to redesign parts in malleable iron. The malleable foundry expert in the Forgings and Castings Section of the WPB also devoted considerable effort to assisting in the conversion to malleable iron castings. While the results of these activities have been excellent, as has been mentioned by THE FOUNDRY on numerous occasions, many tight situations might have been relieved with much greater dispatch if the War services had exhibited less indecision and a little more imagination.

Malleable foundrymen first learned of the criticisms directed at the industry when several ordnance officers appeared before a meeting of the Ferrous Foundry Industry Advisory Committee in Washington on April 22. This committee is composed of representatives of all classifications of ferrous foundries. The ordnance officers exhibited several defective castings in an effort to prove that the malleable foundry industry was not meeting its obligation to war production. Reports indicate that the ordnance officers made no attempt prior to appearing before this committee to check its problems with the companies producing the castings exhibited, or with representatives of the industry.

Within a day or two after this meeting arrangements were made by the malleable representatives on the Ferrous Foundry Industry Advisory Committee for a committee of engineers to meet with representatives of ordnance at Washington on April 29 for the purpose of discussing the problems connected with these charges, so that the necessary steps might be taken to correct the situation. But before this committee could meet, the controversy at Washington was aired before the foundry industry by Colonel Davis at St. Louis and his charges were presented in the local newspapers.

The defective castings exhibited by ordnance were isolated instances and in no way indicate a trend. One casting, a housing which had not been placed in service, was produced two years ago of a composition not suited to the part, and the producer has not manufactured that type of casting since and has discontinued the composition. A second casting had a core shift, and this, coupled with a machining job that in no way followed the specifications, resulted in a scrapped part. The third example is reported to have been a cupola malleable casting submitted to ordnance simply to illustrate the possibility of a particular design. As is mentioned in the statement of the society, investigation has developed the fact that only a few of the millions of malleable castings produced for armament use have been of questionable quality, and according to an ordnance officer, those few have all been in the experimental phase and none, to his knowledge, has failed in service.

The malleable foundry industry, in company with the steel foundry industry and the gray iron foundry industry, has done an excellent job and has made important contributions to war production. Surely this excellent record justifies a more co-operative program for the handling of such future problems of that industry as may arise.

Frank G. Steinebach
Editor

A·F·A WAR

SEES MANPOWER AS MOST

PRESSING problems created by the growing shortage of manpower appeared time and again in both formal and informal discussions at the War Production Congress, staged April 28 to 30 in St. Louis by the American Foundrymen's Association. Conversations throughout the convention indicated that while the difficulties created by materials and equipment shortages have eased considerably since the convention in Cleveland a year ago, the loss of skilled men to the armed forces and to other war industries points to a serious situation in the

Lee C. Wilson (above) and Ralph J. Tector (left), new president and vice president, respectively, of A.F.A. At speakers' table at session on training women (left to right below): W. F. Patterson, War Manpower Commission; W. J. Hebard, Continental Roll & Steel Foundry Co.; Sara Southall, International Harvester Co.

CONGRESS

...OSSESSING PROBLEM

months ahead. For the first time in this war the association program included an important session devoted to the training and use of women in the foundry industry. Other conference sessions considered the problems of training foremen under present emergency conditions, and the maintenance of apprentice training programs in the face of the drafting of youngsters.

The War Production Congress, which included the forty-seventh annual convention of the association, drew the largest attendance for a purely technical meeting in the history of the A.F.A. Well in excess of 2000 men and women, representing all branches of the industry and from all parts of the country, were present in St. Louis. Attendance and interest in practically all of the technical sessions, round table discussions, shop courses and special dinners was exceptionally high. Representatives of the Army and Navy and of the several civilian war agencies in Washington participated in a number of the sessions.

An unusually large audience attended the opening session to be welcomed to the congress by C. B. Shanley, St. Louis chapter chairman, and to hear addresses by Duncan P. Forbes, association president, and Col. Merle H. Davis, chief of the St. Louis Ordnance District.

Mr. Forbes, in urging the foundry industry to make available every means at its command in furthering the war effort, pointed out that efforts of the association in promoting technical developments during prewar years are being returned many fold today. He added, however, that much still remains to be done which would contribute to the prosecution of the war and which would assist the industry in the competitive struggle for markets in the post-war adjustment.

"Our castings industry is not a backward industry, by any means, but it has not been advancing at the rate which is most desirable," he stated. "Technical advance is largely the result of investigations made in the plants of individual companies, and it is natural that the interests of each individual company will dictate the direction in

Col. Merle H. Davis, District Chief, St. Louis Ordnance District, addressing opening session of War Congress

DUNCAN P. FORBES

MAX KU

(Above)—Five new
rectors elected by
A.F.A. (See page 198
biographical sketch
(Left above)—One of
technical sessions of
steel castings sect
(Left center)—View
registration desk. Re
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egates from Texas
special luncheon held d
ing the congress. (Ri
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at the annual banq
concluding the three-d
meeting

MAX KUNIANSKY

HARRY REITINGER

ROY M. JACOBS

WILLIAM B. WALLIS

which their researches shall be guided. As a result of this, much fundamental research work for the good of the castings industry has never been completed." Creation of the American Foundrymen's Association foundation will provide funds for promotion of such work, although Mr. Forbes said that it would be premature to announce details of the plan at this time. More than $50,000 so far has been subscribed to the foundation.

In concluding his address Mr. Forbes announced that C. E. Westover, for the past 2 years executive vice president and treasurer of the association, was resigning to return to active foundry management.

Greetings from the Institute of British Foundrymen were extended to the convention by Frank G. Steinebach, chairman of the International Relations committee, through the following cablegram received from Richard Miles, president, and Tom Makenson, secretary, of the British organization: "The Institute of British Foundrymen send cordial greetings and best wishes for success of St. Louis convention and reaffirm their confidence in final victory through our united endeavors."

In discussing trends in use of castings in ordnance manufacture, Colonel Davis stated that production in the large majority of war industries has run substantially ahead of expectations—so much so that ordnance items are backing up at the seaboards and in depots. This prevails, he said, despite the fact that 90 per cent of Army Ordnance prime contractors are in some state of curtailment—at least in curtailment below maximum capacity, in most cases in curtailment below contracted capacity, and in many cases below capacity for most effective production.

Colonel Davis attributed this unexpected output to underestimation of the capability and versatility of the metalworking industry and to beneficial results of the Ordnance Department's planning the past 20 years for industrial conversion in event of war. But while production no longer is a problem, other knotty questions remain to be solved. These are improve- (*Please turn to page* 165)

Removing Gases and Inclusions in ALUMINUM CASTING ALLOYS

By EDWIN BREMER
Metallurgical Editor
THE FOUNDRY

CONCOMITANT with the scarcity of and the endeavor to spread the available aluminum alloys as far as possible in the production of vital war castings, some difficulties have developed which fortunately can be overcome by exercise of sufficient care. While the process scrap as far as possible goes back into the original alloy, it is not always possible to segregate it completely, so that some mixed material is used. This results in some chemical composition difficulties which can be controlled within certain limits. More important is the effect of the physical form and cleanliness of such scrap because of their possible effect on the quality of the resulting castings. Material which is finely divided will normally result in more dross in the metal if the necessary precautions are not exercised to remove it. Contamination by oil, corrosion products, moisture, etc., if not carefully removed, will result in excessive gas in the metal. Both these conditions can be reduced to a minimum with proper care in the foundry.

One of the troubles encountered is pinhole porosity due largely to the presence of hydrogen gas. A number of degassing procedures are available which give good results. One method employs a gaseous reagent such as chlorine or nitrogen which is introduced into the molten alloy, and often is termed gas-fluxing. To accomplish effective removal of the deleterious gas such as hydrogen, it is essential that the fluxing gas and the tools used for introduction be free from water which is a source of hydrogen. Of the two gases, chlorine and nitrogen, the latter is easier to handle since no fumes are generated in its use, and no health problem is involved. Also at the present time nitrogen is such easier to procure.

Introduction of the gas is accomplished readily through an iron pipe or tube which is coated well with a refractory clay composition to avoid iron pick up by the molten aluminum alloy, or preferably through a carbon tube. The tube should reach to within 2 inches of the bottom of the pot or crucible, and the rate of flow of gas should be such that a rolling motion of the bath is provided rather than violent agitation. Since no health hazard is involved in the use of nitrogen as the gassing agent, hooding and exhausting are not required. However, due to the extremely noxious fumes given off during chlorine gassing, it is desirable that the pots or crucibles be hooded well, and the hoods attached to a powerful exhaust system.

Time of gassing is from 5 to 10 minutes per 100 pounds

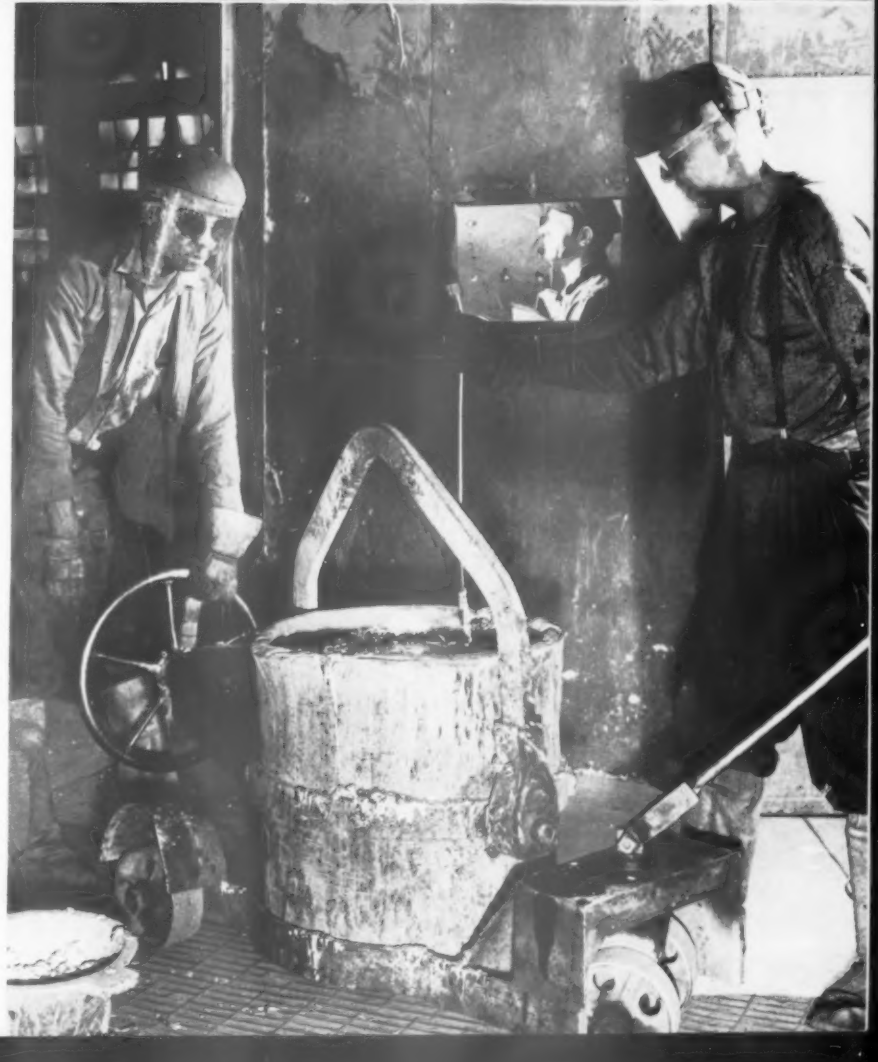
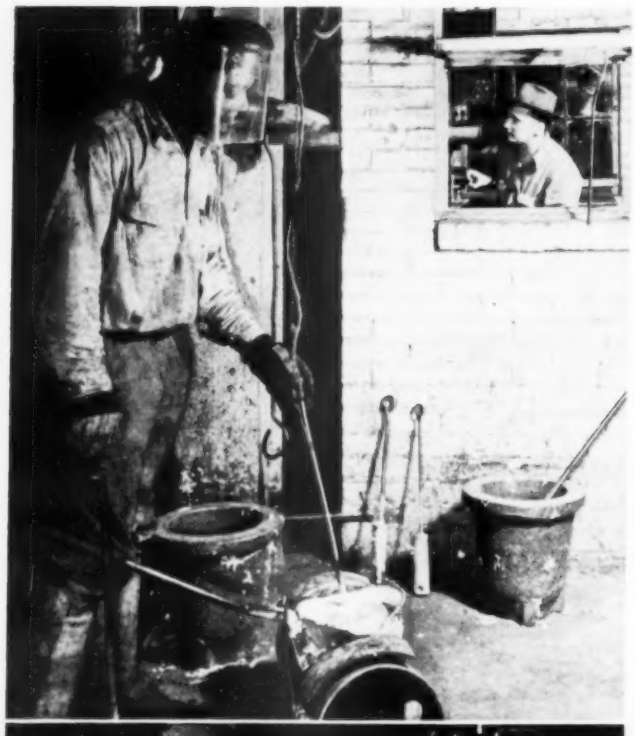


Fig. 1 (Upper left)—In pouring metal from the melting furnace into the ladle the stream should be maintained as short as possible. Fig. 2 (Upper center)—Pouring medium weight castings where the molten metal is dipped from the melting furnaces at the back. Note that the ladle lip is as close to the sprue opening as is practicable. Also each furnace is equipped with a thermocouple to see that the temperature is correct. Fig. 3 (Upper right)—A large mold being poured from four ladles located at corners. Fig. 4 (Lower left)—Placing cores in a mold. Fig. 5 (Lower right)—At the temperature control station a thermocouple is inserted in the molten metal to insure that it is at the correct temperature for pouring the castings



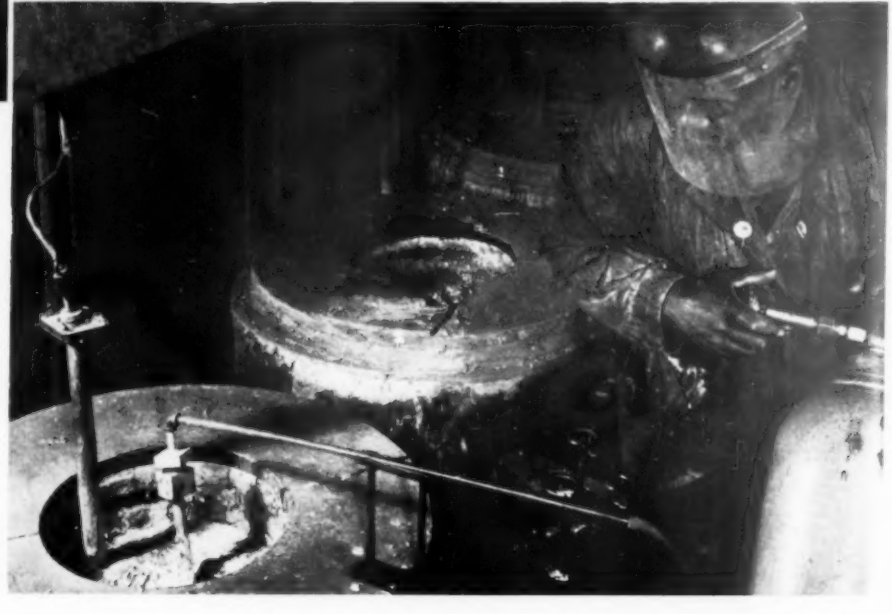


Fig. 6 (Top)—Before pouring a mold the ladle man stops at the temperature control station to check the temperature of the molten metal. Fig. 7 (Above)—In pouring the lip of the ladle always should be as close to the sprue opening as is possible. Fig. 8 (Right)—Use of a gas flux such as nitrogen or chloride aids greatly in removing inclusions and deleterious gases

of metal, and the metal temperature should be between 1250 and 1350 degrees Fahr. because the efficacy is greater in that range than at a higher temperature. Since the gas used must be dry to obtain the desired results, it is wise to check the gas in the cylinders for water vapor by the dew point method. Also as moisture may condense in the tubing when not in use for a period of time such as overnight, it is necessary to dry it out in the morning before use.

Another procedure for removing gas from aluminum and its alloys is to melt it, then allow it to freeze in the pot, and remelt to pour into castings. However, that procedure may prove more costly than a suitable fluxing procedure.

Salt fluxes such as aluminum chloride, zinc chloride and some proprietary fluxes may be used for degassing, but they may not be as effective as gas fluxing. Zinc chloride should not be used in any large quantity since it is reduced to metallic zinc and alloys with the aluminum. To obtain the full benefit from a salt flux, it preferably is introduced at the bottom of the crucible. This can best be done by using a "phosphorizer" or similar tool to immerse the flux. The preferred practice is to wrap the desired quantity of flux in aluminum foil for immersion, but with the restrictions on the purchase of foil, paper is frequently substituted today. The package of flux should be slowly pushed into the molten bath to a point near the bottom and held there until all action ceases. Since the amount of flux to be added depends upon the condition of the metal, the quantity to be added will have to be determined experimentally. Salt fluxes to be at all effective must be absolutely dry and must be maintained in that condition, otherwise they may introduce more gas than they remove.

Since it is comparatively easy to remove gases from aluminum and its alloys, it follows that the molten metal can pick the gases up again just as easily. Hence, due care must be exercised after degassing to prevent the metal from being as full of gas it it was at the start. Sources from which the molten metal can pick up gas include the atmosphere and (*Please turn to page* 215)

Medium tank M4 with cast armor hull; total weight 60,000 pounds. Official OWI Photo by Rittase

By COL. MERLE H. DAVIS
District Chief
St. Louis Ordnance District

Trends in Use of Castings in Ordnance

ONE year ago we were already far along the road in the creation of a war-time ordnance industry in this country. That job is now complete. Perhaps we and all of American industry in partnership with us did this job too well. Today over 90 per cent of the Army Ordnance prime contractors in the United States are in some state of curtailment—at least in curtailment below maximum capacity, in most cases in curtailment below contracted capacity with necessitated contractual changes, and in many cases below capacity for really efficient production.

Meanwhile, we keep most of that capacity open, although curtailed, open for the possible contingencies of the coming months, while precious steel and other metals are diverted to ships, to aircraft and to other activities where shortages still exist.

The first reaction of any intelligent group of listeners to such a statement is, "Army Ordnance must have badly overshot its mark." My answer is a frank admission. We did. I am not going to try to hide too much behind the fact that the Ordnance Department does not make up the quantity requirements for the combat forces in the field. Those quantities are handed us by the General Staff of the Army, but I do not believe that any better figures could have been given to us than those we got.

Even so, we overshot the mark. In one converted industry after another we are obtaining production as we never visualized it. We did not reckon on the versatility of a metalworking industry fresh out of an economic depression. That economic depression may have resulted in skimpy maintenance of plant. Surpluses were diminished. But that economic depression made facilities diversify their product. It made them change their product and improve it. Therefore, we found at hand in 1941 an American metalworking industry ready in its habit of mind for conversion to ordnance products. It was vastly different from the metalworking industry that came to our aid in 1917 and 1918. We could evaluate technological improvements. We could evaluate the increased performance of new cutting tools, of machine tools of improved design, of new and more workable materials. We could not and did not evaluate those intangibles in facilities that had already been schooled in the art of conversion.

I can state too with pride that the Army Ordnance Department has not been idle for 20 years. All of the Ordnance officers of my vintage have been imbued with the idea that in the event of a major war, the conversion of private industry to the manufacture of ordnance would probably be the limiting factor in the war. We believed in this axiom so implicitly that it has driven us for 20 years to take advantage of

(*Please turn to Page* 217)

From an address delivered at the annual meeting of the American Foundrymen's Association held at St. Louis, April 28 to 30

ALLOCATE CORE COSTS TO INDIVIDUAL CASTINGS

By ALBERT E. GROVER

OLD man Webster defines a core as "The portion of a mold which shapes the interior of a hollow casting." Applied to the production of gray iron, steel, malleable and nonferrous castings, cores are classified as: A—Green sand, or those cores made at the molder's floor or bench. B—Dry sand, or those cores prepared in the Core department, by a process of shaping and drying.

Three regular operations are required to produce dry sand cores, namely: 1—Mixing materials. 2—Shaping. 3—Drying (baking in an oven). In this presentation, consideration is given to the analysis and distribution of materials, labor and burden (overhead expenses) costs applicable to each size and shape of core produced.

Materials used for making cores are of two classes, namely: A—Direct, or those materials that form an integral part of the completed core, consisting of sand, flour, oil, etc. B—Indirect, or those materials that do not form an integral part of the completed core, such as maintenance, repairs to equipment and supplies.

Set Up Monthly Cost System

In setting up the system to account for monthly core costs of different patterns molded, forms are prepared for each kind of material used (Fig. 1). These forms are made of 28-pound tough stock; 4½ inches high; 8 inches wide; round cornered; and 7/32-inch holes punched ⅜-inch center to center to fit a multiple ringed binder, so that when the sheets are arranged in the binder, the top space is visible on each sheet so arranged. The name of the material is placed at the top of the sheet so that particular sheets may be found easily when making entries thereto, or when the sheets are filed away for reference after being completely used up or the record discontinued for any other purpose.

In starting the system, inventory of actual quantities of each separate kind of core and expense material is taken, and the quantities—expressed in denominations used for measurement—are entered on the top lines of the forms provided. (See entry for inventory of 200,000 pounds of core sand, Fig. 1).

At the close of the first calendar month, the book of lapped material record sheets is carried to the places where the materials are stored. There the quantities on hand are ascertained and entered in the "quantity" columns of the "on hand" sections of the record sheets. (See entry of 70,000 pounds of core sand on hand 1/31-1943 recorded on the material record for core sand in (Fig. 1).

As illustrated for core sand (Fig. 1) the value of the 70,000 pounds on hand is determined by multiplying it by the price per pound (0.0021) used to calculate the inventory value at the first of the month, when the record was set up. The result of this calculation ($147.00) is entered in the "Value" column of the "On Hand" section of the record sheet.

The 70,000 pounds of sand on hand at the close of the month is deducted from the 200,000 pounds of sand on hand at the beginning of the month, entering the remainder (130,000 pounds) in the "Quantity" column of the "Used" section of the record sheet.

The $147.00 value of sand on hand at the close of the month is deducted from the $420.00 value of sand on hand at the beginning of the month, entering the remainder entered in the "Value" column of the "On Hand" section.

The weight (130,000 pounds) and value ($273.00) of used sand is entered on the "Core Material Costs" schedule (Fig. 2). Costs of other materials used in the core mixtures are calculated and recorded in like manner.

Quantity and cost (including transportation and unloading) of each receipt of materials from the shipper is entered in the "Received" columns of the record sheet. (See entry for material received from the Michigan Sand Co., illustrated on Fig. 1).

When received entries have been made during the month, the quantities and values of materials used are determined as shown in the accompanying Table. (See

Fig. 1—Forms for each kind of material used. Fig. 2—Record of core material costs. Fig. 3—Record of each order. Fig. 4—Tabulation of core indirect labor. Fig. 5—Schedule of core costs, including record of cores used and inventory at end of month. Fig. 6—Monthly compilation of burden

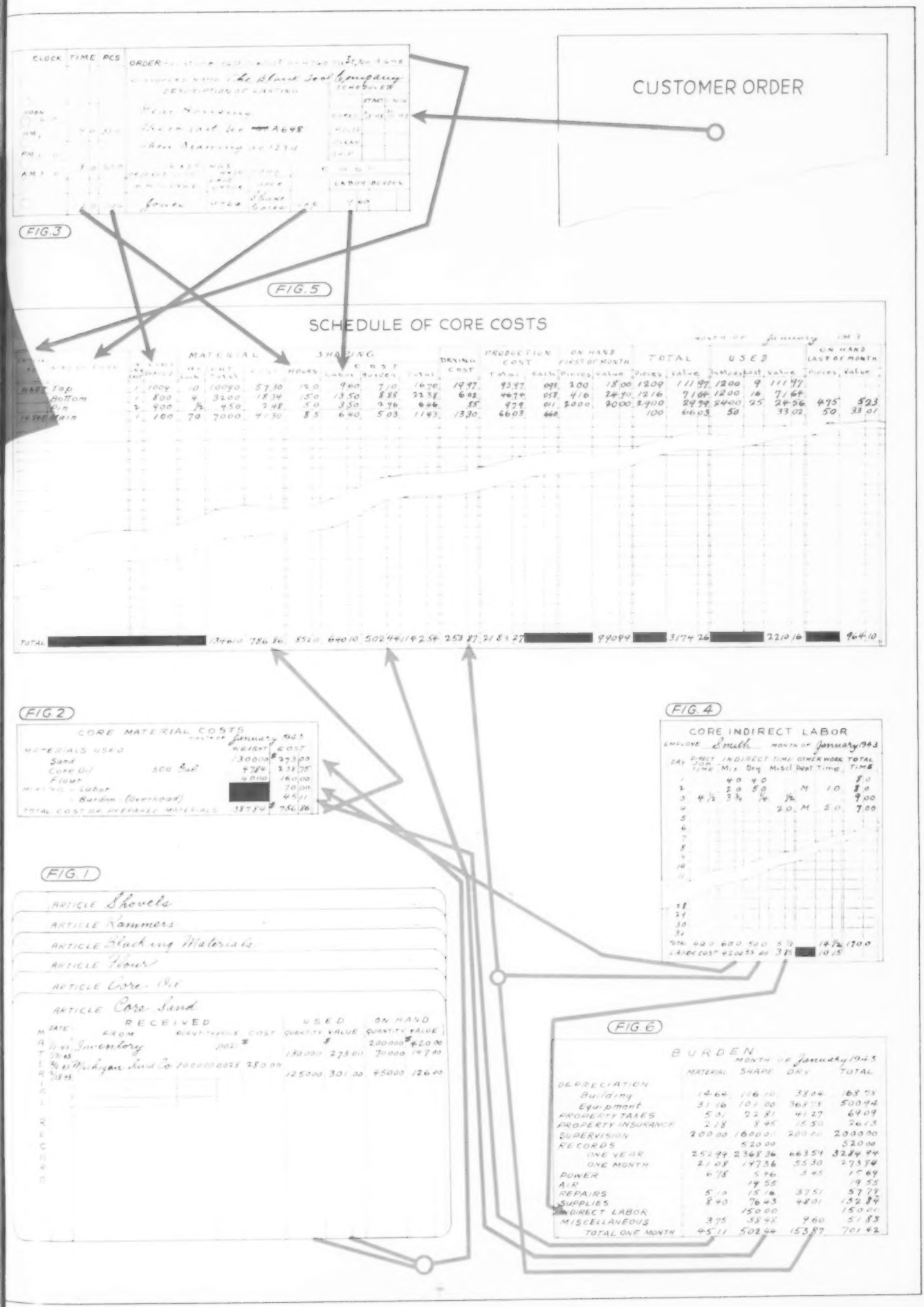

CUSTOMER ORDER
FIG. 3
FIG. 5
SCHEDULE OF CORE COSTS
FIG. 2
CORE MATERIAL COSTS
FIG. 4
CORE INDIRECT LABOR
FIG. 1
ARTICLE Shovels
ARTICLE Rammers
ARTICLE Blacking Materials
ARTICLE Paper
ARTICLE Core Oil
ARTICLE Core Sand
FIG 6
BURDEN

illustration under date of 2/28-43 Fig. 1).

Quantities and values of used materials, as calculated, are entered to the February core material cost sheets (Form shown on Fig. 2). Similar forms and procedures are maintained for calculating and recording costs of materials used for burden or overhead expense charges.

The same forms may be used when it is desirable to measure core materials, daily, as used. However, the author has found the practice of taking an inventory at the close of the month and calculating material costs for coremaking more accurate and involving much less clerical effort, by following the procedure set forth herein.

Referring to "Foundry Orders Should Carry Complete Information" which was published in the June, 1942 issue of THE FOUNDRY it will be observed that forms (Fig. 3) for recording time spent in shaping cores are prepared when the production order is issued. If more than one kind of core is required for the casting, extra cards are prepared when the order is issued.

Starting and finishing times are registered on each job time card. For example, in the job illustrated on Fig. 3, the starting time was 8 a.m. and the finishing time was 5 p.m. on the first day, and the starting time on the second was 8 a.m. and the finishing time 12 noon. These registrations may be made either by mechanical job time recorders or the entries written in with pencil or pen. The author has found the use of job time recorders to be more accurate and less confusing to the workman.

Number of cores made is entered in the "Pcs." column of the job time card opposite each time registration.

When all the cores of the specific kind ordered have been made, the job time card is turned in to the cost office and calculated as follows:

Quantities and Values of Materials Used

	Pounds	Value
Measured Inventory 1/31/43	70,000	$147.00
Plus—February receipts	100,000	280.00
	170,000	$427.00
Less—Measured Inventory 2/28/43	45,000	*126.00
Used in Month	125,000	$301.00

*Latest cost $0.0028 per pound.

1—Each starting time is deducted from the finishing time, and the remainder (elapsed time) entered in the "Time" column.

2—Elapsed times recorded on the card are added and the total entered in the bottom space. (8 + 4 = 12 hours).

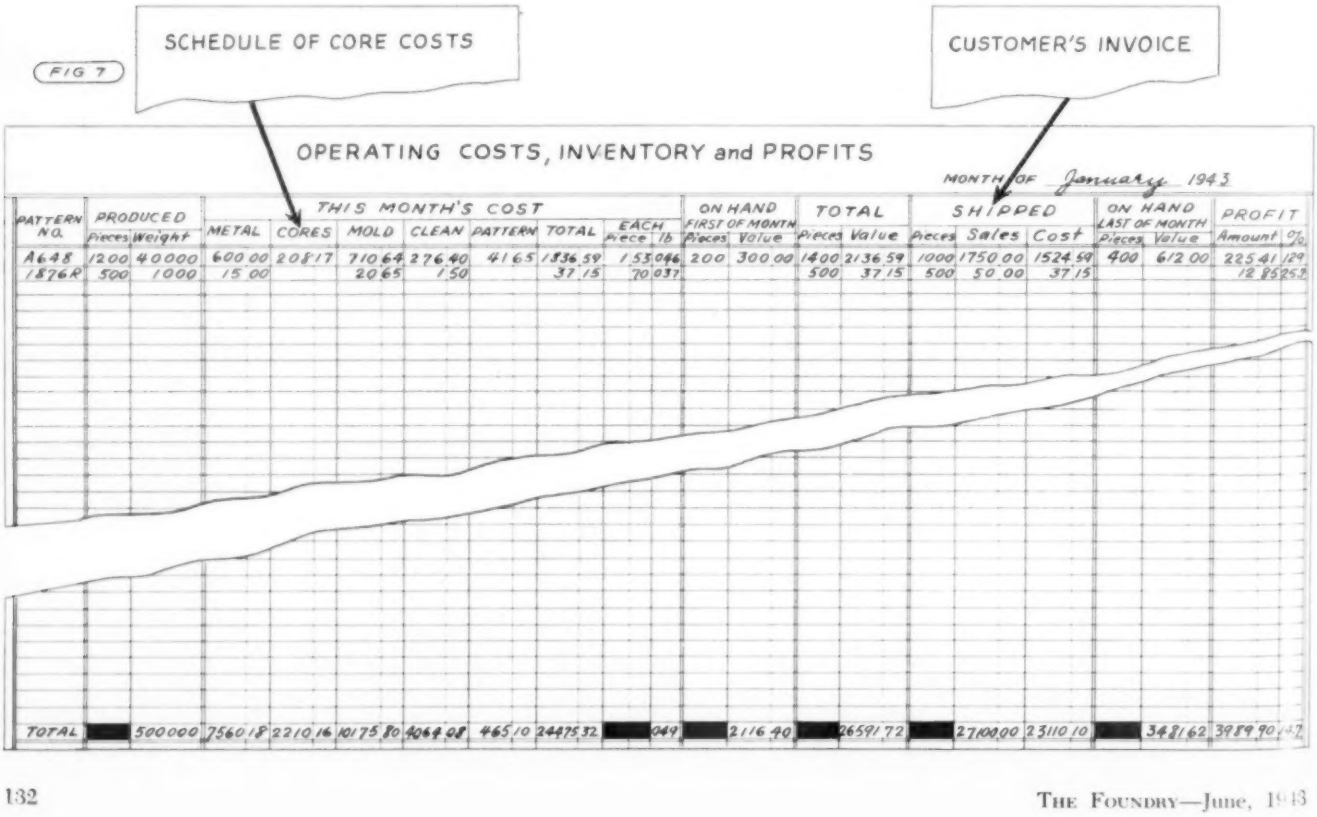
3—Number of pieces recorded on the card are added and the total entered in the bottom space. (359 + 650 = 1009 pieces).

4—Total elapsed time is multiplied by the hourly rate of the employe and the result entered in the "Labor" space at the bottom of the card. (12 × 80c = $9.60).

Should the time and piece registrations on a job time card exhaust the spaces provided on the form, a new card is issued (in the core department) for subsequent registrations, and the completed card turned in to the cost office for computation and record. Time and piece registrations are made on the new card in the same manner as employed for the original card.

The same procedure is followed where payment is made on a piece work basis, except that the earnings (labor cost) is determined by multiplying the number of pieces made by the piece work rate. The calculated job time cards are filed, by part or pattern number, pending their use in preparing the "Schedule of Core (*Please turn to page 223*)

Fig. 7—Schedule of "Operating Costs, Inventory and Profits" is prepared at end of month to consolidate material and operating costs for each pattern used



THE *fatigue* PROBLEM IN INDUSTRY

By STANLEY D. PIATEK
Assistant Personnel Supervisor
Continental Roll & Steel Foundry Co.
East Chicago, Ind.

THE present critical period brought on by the war has created numerous problems. One of these, *fatigue*, is gradually coming to the fore and is beginning to attract the attention of both the industrialist and the industrial physician.

Unquestionably, the productivity of this nation will share top honors with our combat forces when finally the Axis is defeated. However, before this ultimate victory can be achieved, certain restrictions must be tolerated and certain "normal" ways of life temporarily abolished. Somewhere someone stated that to give man a basis for an ideal existence, his day should be divided into three equal parts: eight hours for work, eight for play and eight for rest. Seldom is one permitted to thus regularly enjoy daily existence, even in normal times; but we do know this: A drastic departure from this mode will eventually result in physical or mental abuse, or both.

Fatigue is rampant in industry today. Not only is it a source of worry to management, who fear that once it gets out of hand it will create havoc with production schedules, but it is also fast becoming a problem to the industrial physician who is now recognizing it in a sharp rise in occupational injuries, absenteeism and lessened resistance to general maladies. Another sequel of the problem is the number of public accidents brought on by organic or mental ailments attributed directly or partly to this condition. Last year alone, enough men between 20 and 45 were killed in traffic accidents to form an entire army division—ten thousand workers!

One cannot peremptorily dismiss fatigue by simply recommending the removal of the causes, because today, especially, the so-called "necessary evils" which are causing fatigue must remain with us for the duration in order that we may accomplish more important objectives. We are aware that fatigue facing the industrial worker nowadays is mostly physiological, somewhat psychological and slightly environmental. To offset the physiological aspect, it would be necessary to curtail production methods and schedules. This, of course, we will not do. Especially with France's example before us, we must for the present forget the normal approach to this problem.

You will remember a couple of years back when for social and economical reasons France had adopted a 40-hour work-week. This plan employed at the right time is very commendable. However, it was instituted only shortly before Hitler's rampage; and when the Frenchmen finally awoke to the full seriousness of their inadvertent experiment, they plunged into frenzied production of war materiel. That it was too late, we know. Thus, here in this country where more plants are going up and an acute shortage of skilled and semi-skilled workers has long been felt, we must continue to work ourselves to plus capacity. If necessary, we have to stay on the job 7 days a week and often work more than 8 hours per day. We will note here that it is not only industry which is suffering from overwork. A glaring example of this is the medical profession on the home front, which also is feeling this problem since so many of their ranks have been required in the armed forces.

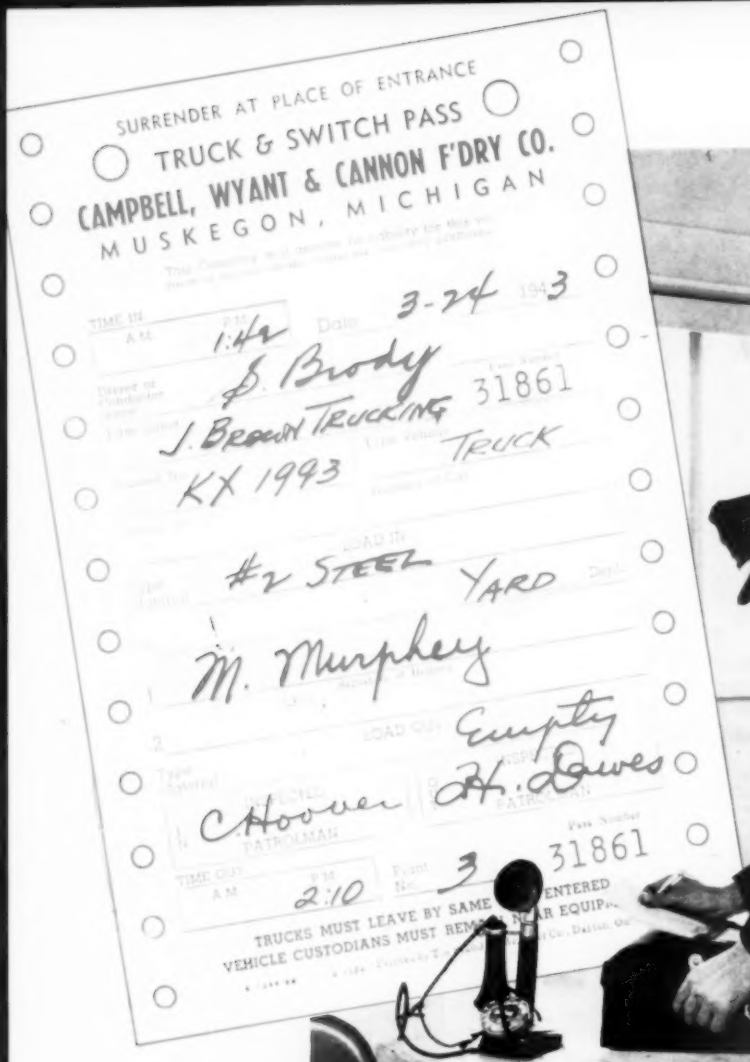
Modern method of warfare by mechanization makes it imperative that industry participate more fully in the war effort than heretofore. The *battle of production* is no mere pep slogan. This system of mechanized warfare also makes it obvious that even to sustain a satisfactory defense, one must be within close equality to the aggressor in the number and type of armament. To carry on a successful offensive, it is held that the attacking unit be trebled in men and equipment to the unit assaulted. Some authorities increase this ratio. So, to outproduce the enemy three to one and counteract the definite labor shortage, we have no alternative but to work harder and longer than in the past.

We read much these days, however, in articles dealing with fatigue that the subject of "increased working hours" is obtaining too much unnecessary attention. Authorities on fatigue contend that there is yet little actual proof that long fatiguing periods of work leave permanent injurious effects on health or work efficiency. On the other hand, here is an interesting sidelight: At the time of the Dunkirk evacuation the British worked 12 hours per day, 7 days a week, and while production did increase for a short period, within 2 months production started to fall and absenteeism became general. Since absenteeism was especially high on Saturday afternoon and Sunday, the National Expenditure Committee of the Commons recommended abolishing Sunday work. They found out also that when the working day was reduced to eight hours, absenteeism dropped 33 to 40 per cent. In Germany, 10 to 12-hour work-days are permitted, but in the case of a 12-hour day rest intervals totalling 2 hours are enforced—or were.

Dr. Haggard describes fatigue as being a product of work done. He elaborates by saying that man's susceptibility to fatigue is influenced by his constitution, habits of muscular use, work environment and the nature of the task. This is physical fatigue. It is the result of excessive activity (*Please turn to page* 226)

From The Journal of the Indiana State Medical Association and reprinted through the courtesy of that organization

Problems of Plant


SURRENDER AT PLACE OF ENTRANCE
TRUCK & SWITCH PASS
CAMPBELL, WYANT & CANNON F'DRY CO.
MUSKEGON, MICHIGAN
TIME IN A.M. 1:45 P.M. Date 3-24 1943
Driver or Custodian S. Brody
Firm Name J. Brown Trucking
Truck No. 31861
Truck Type KX 1993 TRUCK
Road In #2 STEEL YARD
Part Loaded M. Murphey
Empty
Patrolman C. Hoover
Patrolman H. Dawes
TIME OUT A.M. P.M. 2:10
Trailer No. 3
Tare Number 31861
TRUCKS MUST LEAVE BY SAME ENTERED
VEHICLE CUSTODIANS MUST REM... EQUIP...

By WALLY E. GEORGE
Campbell, Wyant & Cannon Foundry Co.
Muskegon, Mich.

nt Protection

PLANT protection means something more than a strong fence and an efficient police force. Those safeguards may keep the saboteur out of the factory, but careless workers and ineffective safety measures also must be prevented from causing damage and retarded production from within.

While we are primarily concerned with the safety-consciousness of our employes, we have also taken numerous steps to prevent enemy-inspired damage to our plants and equipment. Late in 1940 we received 52 specific recommendations from the Federal Bureau of Investigation regarding protective measures for our three Muskegon plants, and the management took immediate steps to carry out all the urgent and important suggestions. One called for additional fencing at two plants; another for inauguration of a system of passes to operators of incoming trucks and trains into the various plants.

These passes are made out in triplicate on a register, one copy staying in the register, the original going with the driver—to be surrendered when he leaves—and the other copy being held at the entrance gate in an open checking file. Every man on an entering truck must sign the register, but on trains the conductor signs for the entire crew. Railroad car-checkers, entering at the railroad gates, also sign this same register.

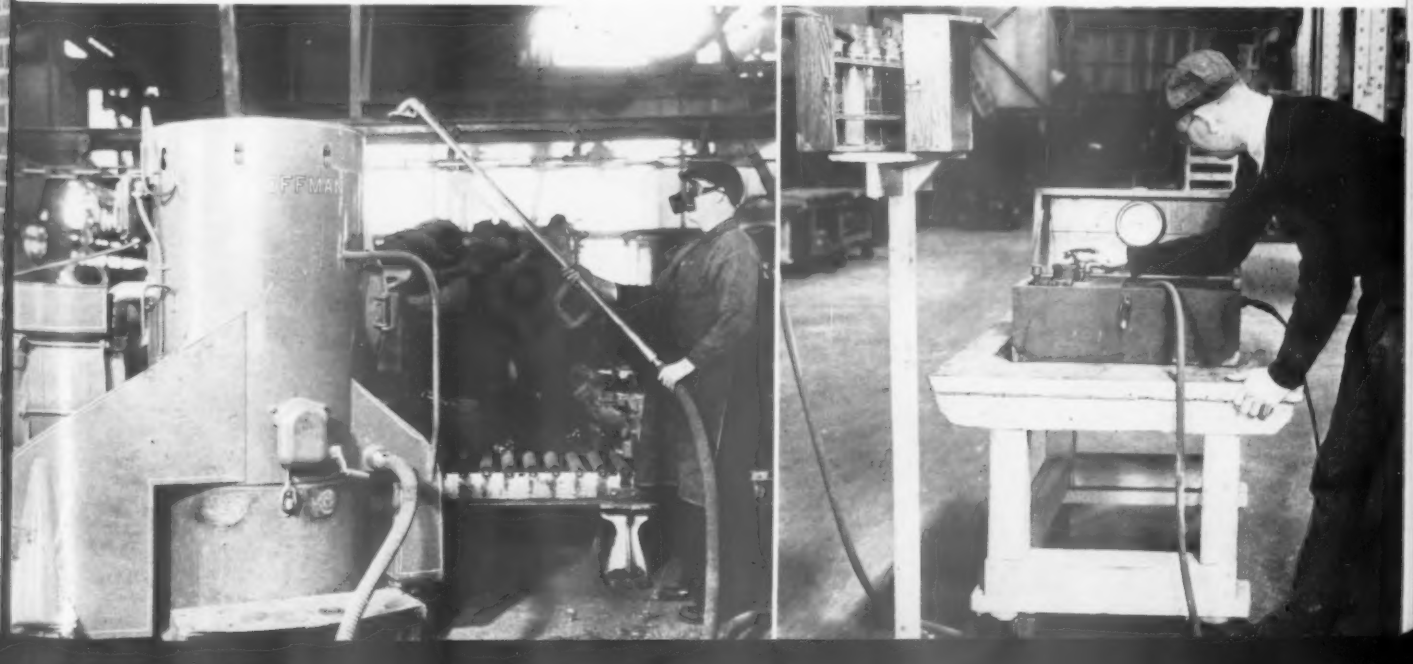
During the past two years we have practically doubled the size of our plant protection force. It now numbers 36 men—and two dogs. Our chief of police has a sergeant in charge of each shift. The latter makes the rounds of the entire plant once an hour, not to punch clocks but to check on those reporting to him and to look carefully for any unusual circumstances.

All Officers Are Deputized

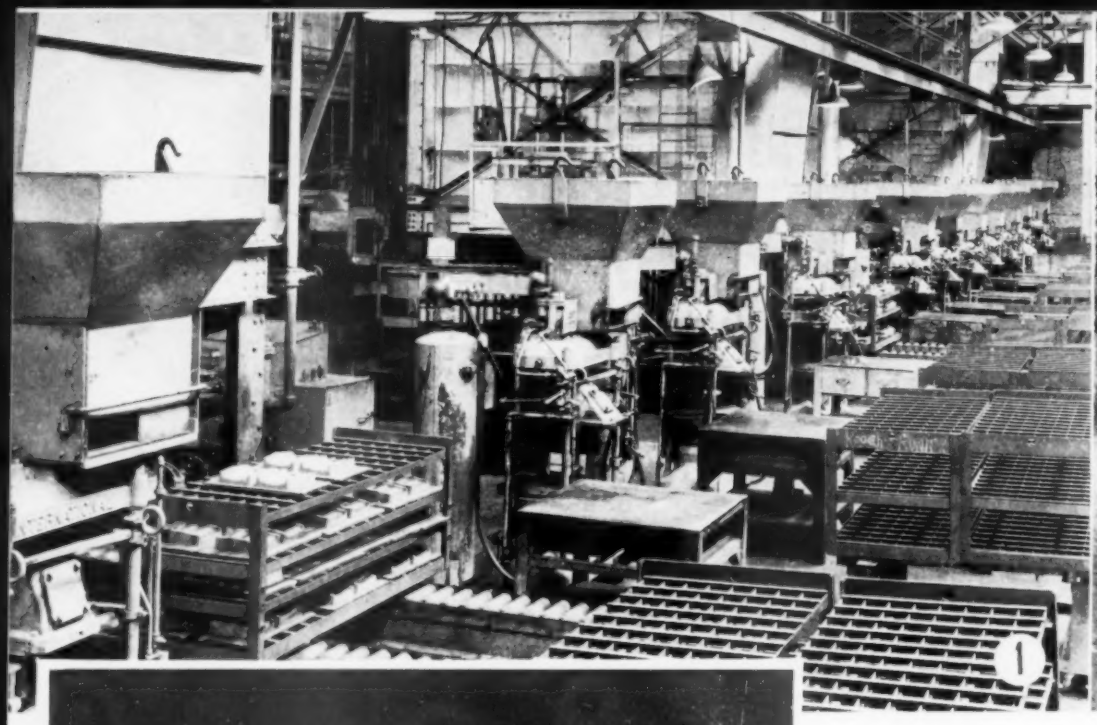
All the regular force, as well as these officers, are special deputy sheriffs from Muskegon county and must, therefore, maintain their dignity as law enforcement officers. They are instructed not to become overly friendly, never to indulge in horseplay. Good personal appearance is required. To attract the right kind of men, rates are as high as those of the regular law enforcement forces in our community and they are able to buy their own uniforms without financial burden. The company furnishes the force with guns, holsters, belts, caps, badges, flashlights, raincoats, gas-billies, and ammunition.

Our 24-page Plant Protection Force Manual is their bible for general and specific instructions. It was compiled after careful study of other manuals used by large firms, of insurance booklets, police manuals, and other sources. Each man is required to familiarize himself with all the general instructions and to learn the specific ones pertaining to his own post. In addition, each man is given a copy of the Michigan Police Law Manual.

We have had only one bomb scarce—about 3 years ago. An unlighted missle was discovered just outside the back fence 10 days after a poster was first displayed announcing a reward of $250 for evidence leading to a sabotage conviction—and there is still a suspicion that its finder was its manufacturer. (*Please turn to page* 228)



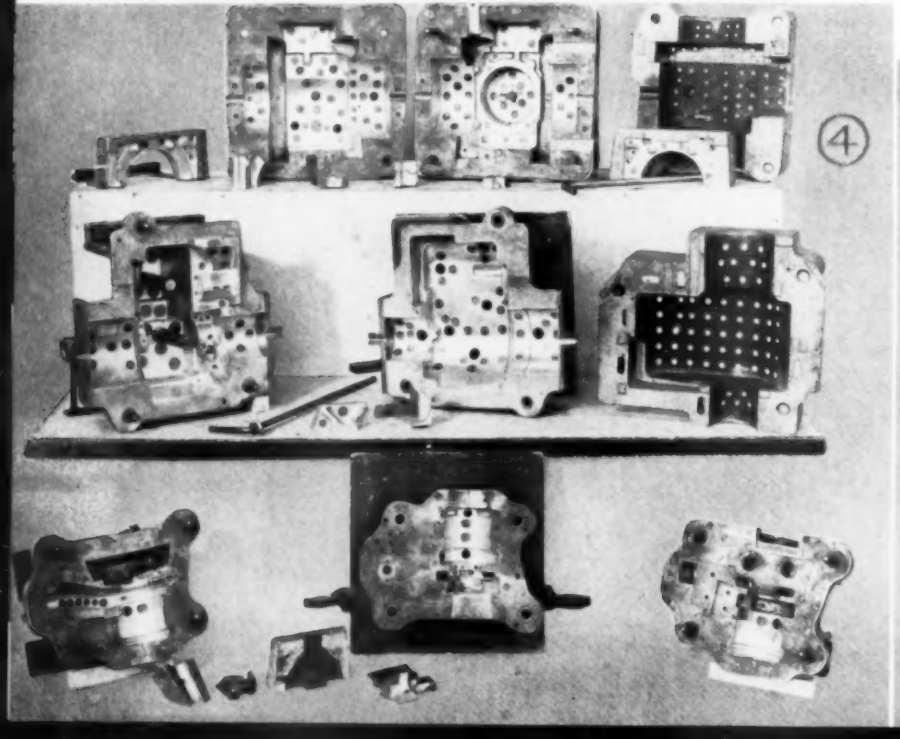
(Upper left)—Operators of incoming trucks and trains are required to sign the register, passes being made out in triplicate. (Lower far left)—Light meter readings are taken regularly to determine light efficiency. (Lower left)—Guards at the gate inspect contents of all packages carried by employes. (Below)—Removal of dust accumulations reduces exposure to workers. (Lower right)—Chemist takes air samples in core room for dust count

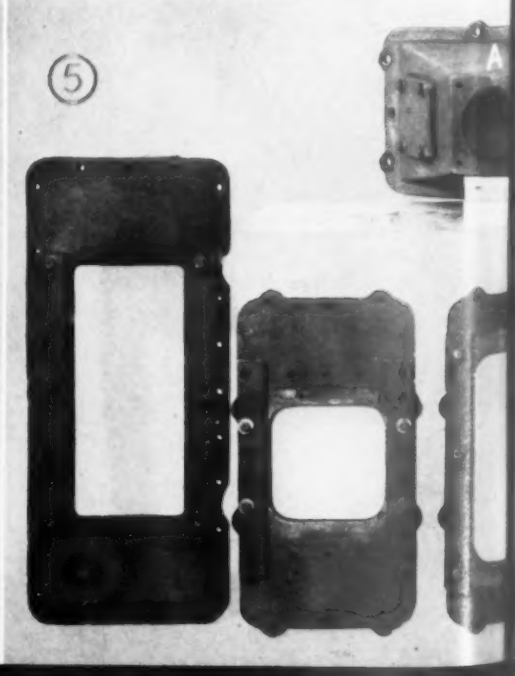


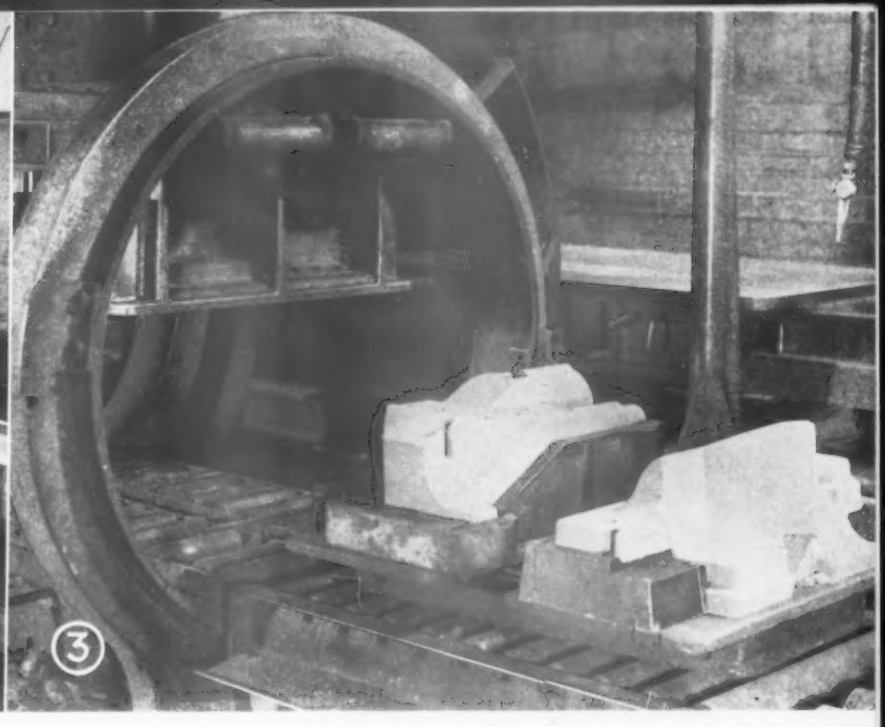
Core Blowing IN A SEMI-PRODUCTION FOUNDRY

By Z. J. MADACEY
Caterpillar Tractor Co.
Peoria, Ill.

Fig. 1—Battery of core blowing machines of the smaller type arranged to take a minimum of floor space, leaving ample room for operating efficiently. Racks used for unloading cores for baking also shown. Fig. 2—Illustrating sequence of operations on continuous system. Core blown at (A), roll-over and drawing at (B), cores on plates (C) being conveyed to baking racks. Core boxes are being returned by conveyor (D) to core blower. Fig. 3—Roll-over equipment showing two completed cores. This two-box practice is followed only when both cores are to be used for the same casting. Fig. 4—Examples of core boxes and driers for core blowing. Fig. 5—Sand reservoir (A) and magazine plates. Fig. 6—Equipment used to make frequent changes with a minimum of lost time







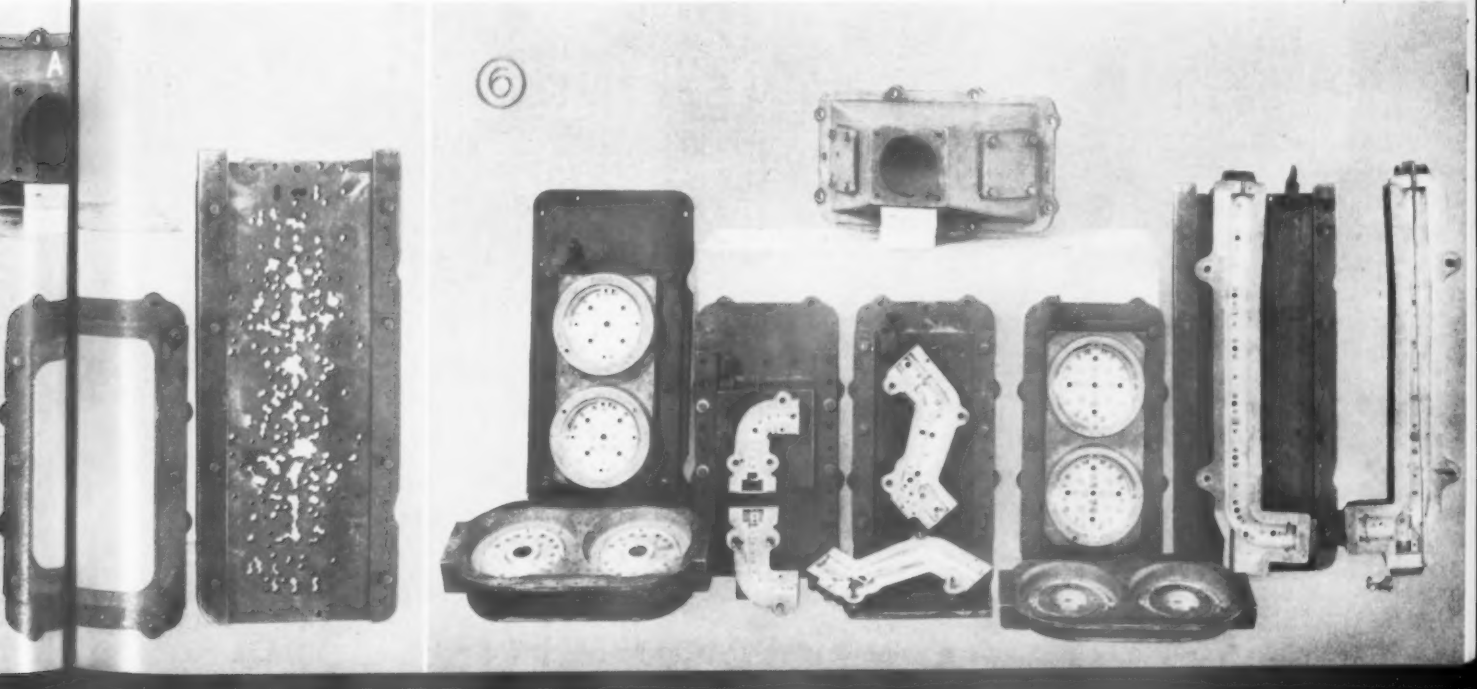
EXPERIENCE has demonstrated that it is not necessary to be one of the select few of highly specialized production foundries in order to produce economically, quantity and quality cores of all shapes and sizes by core blowing. Numerous semi-production foundries report an increased percentage of cores made by blowing.

It has been our observation, through years of experience, that successful practice in blowing cores depends upon several major factors. These factors will be discussed in the order of their importance. Fig. 1 illustrates a battery of smaller type core blowing machines, conveniently arranged to take up a minimum amount of floor space, leaving ample room for operating efficiency. Due to the variety of light, medium and heavy castings made, it became necessary to equip each of these machines with individual sand containers to insure accurate distribution of sands to the job for which each was originally intended. One of the many factors involved is accurate sand control. It is obvious moisture plays an important part in the blowing of cores.

Sands having a moisture reading of less than 1.8 per cent are considered dry and detrimental to both cores and equipment. The core made of sand which is considered dry will not hold the shape and size required. Such sand will adhere to the core box due to the fact that water, at this stage of the operation, acts as a binder, cementing together the individual sand grains, and the finer the sand the more pronounced this condition becomes.

The air intended to move a volume of sand when the blow valve is released does not move dry sand in the required volume. It blows through the sand, carrying into the box cavity only a portion of the intended amount of sand, setting up a drastic cutting action. Under such conditions the oil in this first spray of sand entering the box oxidizes very rapidly from the rushing stream of air and naturally follows the displacement of air caused by the air vents and the joints of the box. Having done this damage to the box by the cutting action, the oxidized sand wedges in the vents between loose pieces and, in some cases, between the joints of

From a paper presented at the annual meeting of the American Foundrymen's Association held at St. Louis, April 28 to 30



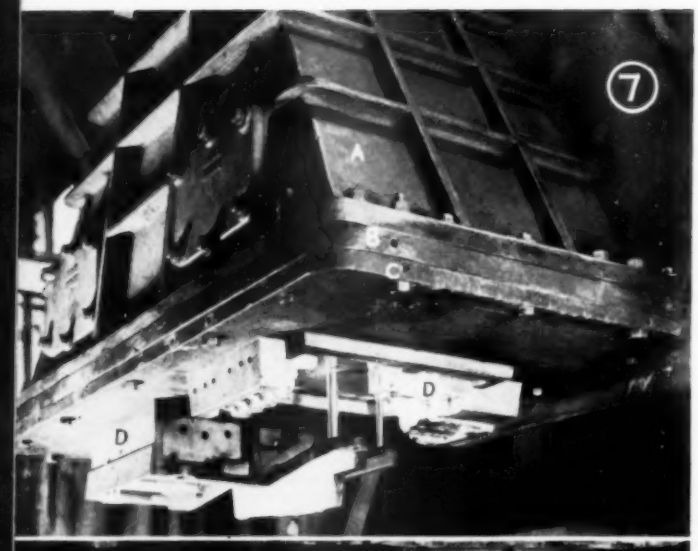


Fig. 7—Showing assembled boxes on core blower, magazine (A), magazine plate (B), blow plate (C), upper halves of core boxes (D). Lower halves of core boxes are mounted on machine table directly underneath upper halves. Fig. 8—Master blow plate (B) for large core boxes

the driers. Then any additional air entering the box cannot pass through. The air, becoming compressed, fills the cavity in the box, making it impossible for any additional sand to enter. Also, the sand which has wedged in between loose pieces and driers causes them to stick when the box is drawn.

If an attempt is made to use sand which is considered dry, yet not quite dry enough to prevent blowing, considerable wear can be noticed on the core surface of the box after some 200 to 300 cores are blown. Directly underneath the blow holes, boxes have been known to wear as much as 1/32-inch in about 3 hours. Hardened steel inserts will prevent wear directly underneath the blow holes, but will not prevent wear on parts in the path of the moving sand.

Oftentimes soft rammed cores are attributed to the lack of vents or blow holes, and, in some cases, to both causes, when in reality the condition or moisture content of the sand is at fault. Moisture readings above 1.8 per cent for core mixtures for our smaller type machines and above 3 per cent in our large ones, are considered wet. Sand with higher moisture reading can be used with considerable difficulty. Excess water is blown from the individual sand grains when the blow valve is released and forms a pool underneath the blow hole, causing the sand to stick to the box. Cores blown with sand of a high moisture reading will also sag and lose their intended shape, the same as soft rammed cores made by hand or jolt machines. Excess water also breaks down the cereal binder which is used for green bond. It has been our experience that moisture limits for sands for small blowers must be held between 1.8 and 2.2 per cent and on large blowers from 2.5 to 3.5 per cent. We have found that the shallower the core, the (*Please turn to page* 230)

Table 1

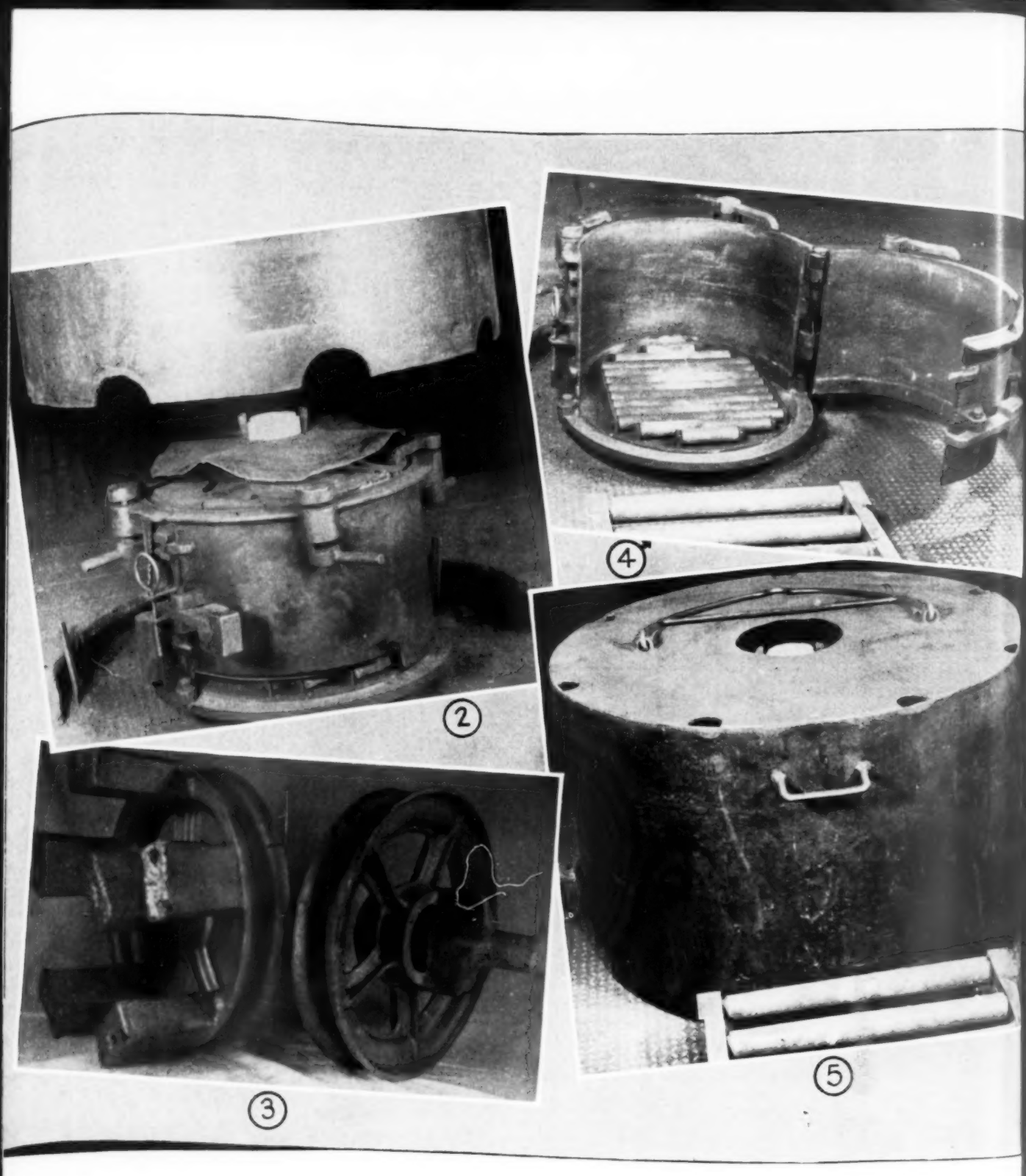
Tests of Core Sand, With and Without Iron Oxide, Other Factors Unchanged

	—With 2 Per Cent (FE_2O_3) Iron Oxide—			——Without (FE_2O_3) Iron Oxide——		
Green Compression (lb. per sq. in.)	1.2			0.85		
Permeability (A.F.A. No.)	170			180		
Moisture (per cent)	1.7			1.8		
Baked at	400°F.	450°F.	475°F.	400°F.	450°F.	475°F.
Dry Compression, lb. per sq. in.	160	400	160	440	420	360
Permeability	200	200	200	210	210	210
Tensile, lb. per sq. in.	29	48	28	48	112	58
Collapsibility at 2000°F., min.	9	12	12	2½	5½	3½
Collapsibility at 2500°F., min.	4	12	12	2½	3	2½
Expansion at 2000°F., in.	0.010	0.018	0.019	0.004	0.008	0.016
Expansion at 2500°F., in.	0.009	0.011	0.009	0.009	0.008	0.013
Expansion time 2000°F., sec.	120	120	60	15	15	45
Expansion time 2500°F., sec.	15	45	30	90	15	30
Contraction at 2000°F., in.	0.008	0.018	0.012	0.009	0.012	0.008
Contraction at 2500°F., in.	0.019	0.063	0.069	0.014	0.013	0.007
Maximum Contraction time at 2000°F., min.	9	12	12	2½	3½	3½
Maximum Contraction time at 2500°F., min.	4	12	12	2½	3	2½

Fig. 1—Various gating arrangements used for hollow and solid hubs. Medium-size sheaves with hub diameters up to 5 or 6 inches are cast with one ingate; larger sheaves and hubs take two or more ingates

CENTRIFUGAL machines which are used at Oklahoma Steel Casting Co., Tulsa, Okla., are the vertical spindle type. Patterns are mounted on 1-inch thick, round plywood boards, and inserted in cope and drag mold boxes. Fig. 10 shows cope and drag patterns, with guide core prints. Fig. 11 shows drag mold box with pattern in place. We use the dry sand core mold practice. Core molds are made on a Hermann jolt roll-over draw machine, and dried in Foundry Equipment Co. recirculating core ovens. Internal cores are dried in the same ovens. The kind of sand used should vary to suit the particular job to be performed. An ordinary silica oil sand will do for most jobs.

The method of closing cope on drag varies, due to size. Smaller ones are closed by hand, by means of hand holes in the sides. The larger ones are closed by means of hoist. Matching up of cope and drag halves is by two methods, one being the offset joint on outer edge of mold, the other by the use of round tapered guide cores, when the job permits. Fig. 7 shows offset joint on cope and drag. Fig. 9 shows mold closed. Fig. 4 shows empty machine flask and part of roller conveyor. Fig. 6 shows mold in



flask just before closing.

Cope and drag halves are held together by cover being placed on top of cope and clamped down by means of an arm that is fastened to side of flask and swung into position over cover, and is tightened by two tapered surfaces coming together, on the order of a cam, forcing arm down on cover. This same cover has a hole in center for locating of runner cup. Fig. 2 shows flask closed with cover in place and clamped down, and guard ready to be lowered.

Guard for the machine, consisting of a cover that fits over it, is raised and lowered by means of hoist on a rail over the machines. Metal is poured into molds by either two-man hand shank ladles, or by a ladle suspended from hoist on monorail, directly over center of the machine. Fig. 5 shows guard in place over flask and mold ready for pouring.

Molds are loaded on and unloaded from flasks on roller conveyor. After molds are poured they are sent to cooling room, before being placed on a Simplicity shakeout machine. Castings are taken off shakeout by overhead hoist on monorail. The core lumps drop off end of shakeout into a hammer mill, and from there on to two vibrating screens, one 3/16-inch mesh and the other 20-mesh, after which sand is taken to washer and prepared for return to reclaimed sand storage.

Steel which is cast centrifugally can be poured colder than in the static practice, due to cen- (*Please turn to page* 234

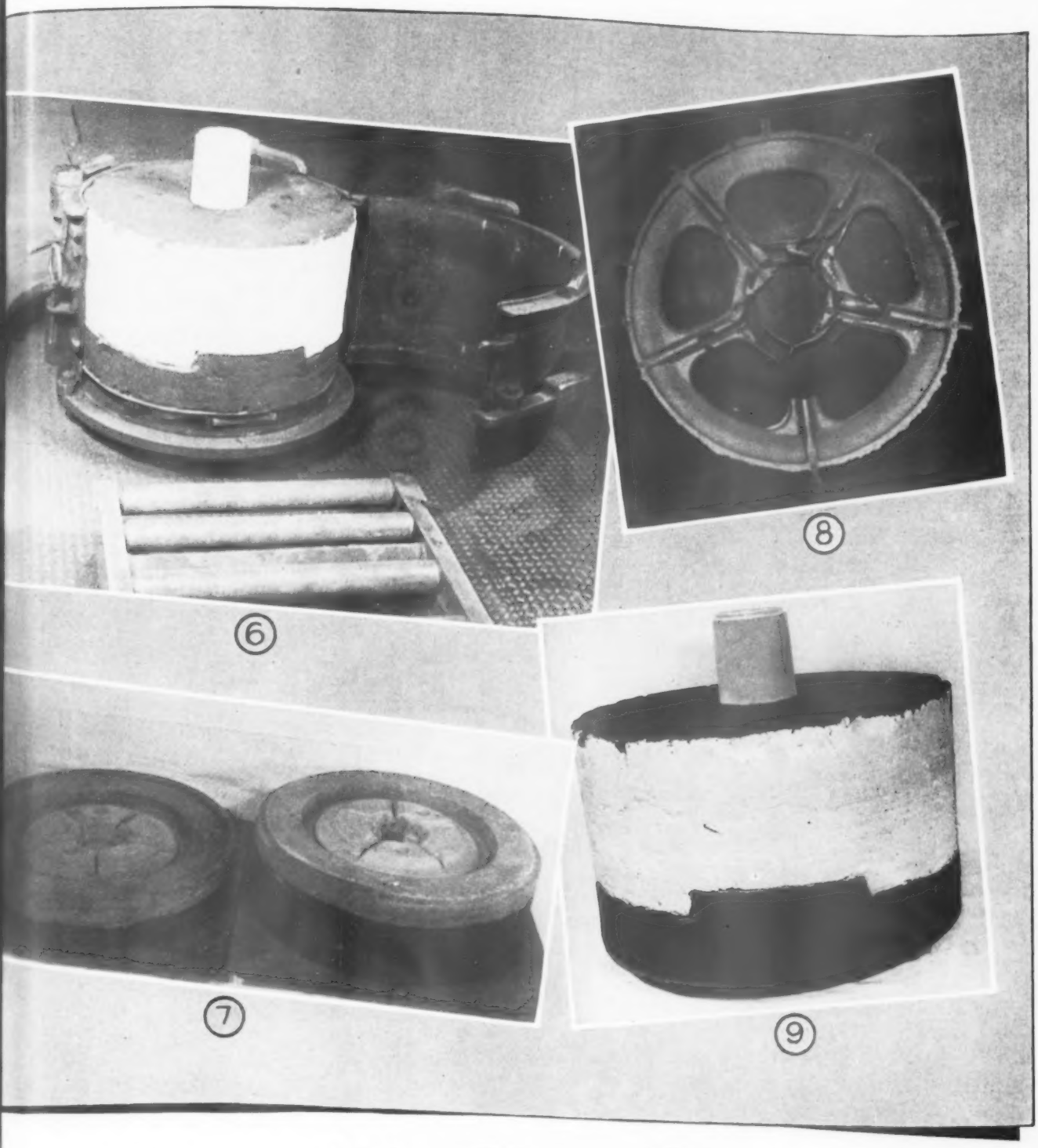
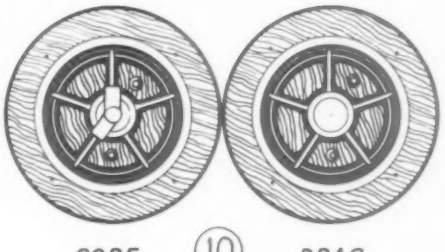


Fig. 2—Flask closed with cover in place and clamped down. Fig. 3—Static and centrifugal cast sheaves. Fig. 4—Empty machine flask and part of roller conveyor. Fig. 5—Guard in place and mold ready for pouring. Fig. 6—Mold in flask before closing. Fig. 7—Offset joints on cope and drag. Fig. 8—Result of pouring sheave short. Fig. 9—Closed mold. Fig. 10—Cope and drag patterns with guide core prints. Fig. 11—Drag mold box with pattern in place



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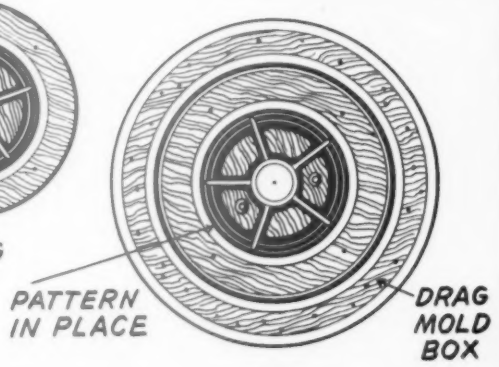

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A paper presented at the annual meeting of the Steel Founders' Society of America held at Chicago, Feb. 10-11

Change in Composition Should Not Affect Heat Resistance

We have been producing large quantities of furnace castings for production of synthetic rubber. According to our information the castings ordinarily encounter temperatures from 1000 to 1400 degrees Fahr., and are not subject to strain or shock. Our present composition shows 1.85 per cent silicon; 0.085 per cent sulphur; 0.25 per cent phosphorus; 0.65 per cent manganese; 1.50 per cent chromium; 0.50 per cent molybdenum, and 3.50 per cent total carbon. Section thickness ranges from ⅝ to ⅞-inch. In the light of critical molybdenum shortage, we have been asked to use 1.25 per cent nickel instead of 0.50 per cent molybdenum, and our question is whether such a change will react favorably or unfavorably on the heat resisting properties of the casting. Or, can you suggest an alternate composition for cupola iron which would give similar heat resisting properties as the analysis mentioned?

In our opinion the change in composition you mention should not affect the heat resisting properties to any extent since chromium is the active inhibiting agent. We should judge that your present composition provides an iron with a mottled fracture and apparently machining is not involved. If that is the case, we believe that a reduction in silicon and total carbon content would be helpful.

Trouble With Manganese Bronze Caused by Gating Practice

Manganese bronze is giving us trouble in casting small tube fittings. Can you give us information on—temperature (maximum, killing and pouring)? Also advise what you consider the best flux and method to get highest quality castings with manganese bronze. We are using tilting type crucible furnaces, natural gas fuel. Metal runs 55 to 60 per cent copper, manganese about 3 to 3½ per cent; aluminum 1½; iron from 0.5 to 2.0 per cent and zinc making the balance for about 40 per cent.

The manganese bronze you describe should give you very little trouble and needs no fluxing. That is, provided it is made from first class ingot, and we assume that you are making your work from ingot purchased from a reputable manufacturer. If you are making your own manganese bronze, have you tested it to check the accuracy of your melts to the desired formula? Obviously, wide variations in the proportions of the different ingredients influence the casting qualities and the proper pouring temperature materially. There is need for the addition of sufficient high grade zinc to compensate for that which is volatilized or vaporized during the melting process so as to bring the melt back to the standard formula.

Possibly one of your troubles is the result of excessive loss of zinc during melting and possibly the cumulative effect of melting of gates, risers and sprues over and over again, thus accentuating the zinc loss. This would result in a metal which would not analyze within gun shot of the desired formula. If your material is up to formula you should not have to pour the castings above 1850 degrees Fahr. unless they are exceedingly thin. The fact that you are making your castings of manganese bronze may be a new experience for you. Possibly you have been making castings in the red brasses and therefore, you are not aware of the fact that manganese bronze demands large risers located so as to insure proper feeding. Without adequate feeding no manganese bronze casting is ever satisfactory, particularly when under hydrostatic test.

If you had given us some picture of what troubles you are experiencing and possibly send us a casting which we would fracture we could more accurately diagnose your trouble and give you specific remedies. We doubt if it is in your melting practice except for the maintenance of zinc proportions and we doubt if it is in your pouring temperature if your metal is living up to standard formula, but we believe you will find it in the gating and the provisions for feeding through adequate risers properly located.

Use Cupola Process for Making Low Carbon Gray Iron

Some time ago we saw a reference to the Corsalli process for melting low carbon iron in the cupola, and we would like further information on it, particularly on the material used for coating the coke. Is the process being used?

The process you mention was developed in Germany some 17 or 18 years ago. The cupola employed differed from the usual type by having an auxiliary apparatus consisting of a tube or pipe on the outside. The tube entered the cupola at a point just above the tuyeres, and extended vertically to the charging platform, and was used for the addition of ferroalloys. Charges consisted of two-thirds steel or wrought iron scrap and one-third runners and risers and other scrap from previous heats. About 0.8 to 1 per cent silicon was added in the charge, and the remainder through the tube. Ferromanganese also was added to the metal charge through the tube.

Maximum coke charge was 10 per cent and the blast volume about 1½ to 2 times that in ordinary cupola operation. The coke used was coated with lime sludge. Carbon in the final iron ranged from 2.64 to 2.82 per cent, and the low carbon was attributed to use of the lime coating and the high blast.

So far as we know, no foundry in this country is using the process described, but a number are securing low carbon gray irons by careful cupola operation. In general the charges are high in steel scrap; the bed low; the coke hard and usually high in ash, and the iron is not allowed to remain in the well.

Desires Information on Aging Aluminum Alloy Castings

We will appreciate receiving information on aging aluminum. Can gas be used as fuel and what is the temperature and length of time required?

Aging, or as it more properly is termed, precipitation heat treatment of aluminum alloy castings, is conducted at comparatively low temperatures, and the furnace used may be heated by gas, oil, or electricity. To attain the most effective and consistent results, the furnace design and temperature control equipment must be such that the temperature within can be controlled to a plus or minus 5 degrees although in some cases the variation may range between plus or minus 10 degrees. Temperature and length of time required for aging depend upon the composition of the alloy to be treated. Usual temperature range is from 250 to 340 degrees Fahr., and the time from 1 to 24 hours. Since many phases relating to heat treatable alloys and the heat treating procedures are proprietary processes, we suggest that you consult your metal supplier for more definite data.

Monel Sheet Scrap May Not Cause Hard Spots in Bronze

Can sheet monel metal scrap be added to bronze to supply a nickel content? We understand that such practice with a high lead (15 per cent) bronze led to complaints of hard particles ruining the edges of tools during machining.

Your reference to difficulty in machining high lead bronze where sheet monel formed the nickel addition, leads us to the opinion that something else caused the trouble. Regular sheet monel metal contains approximately 67.35 per cent nickel, 30 per cent copper, 1.4 per cent iron, 1 per cent manganese, 0.1 per cent silicon with a small amount of carbon and sulphur. If 1 pound of sheet monel was added to the bronze to give a nickel content of 0.67 per cent, only 0.014 per cent iron and 0.01 per cent manganese would be added, which should not cause trouble. If 5 pounds of monel scrap was added to give a nickel content of 3.37 per cent nickel, the iron content would be 0.07 per cent and the manganese 0.05 per cent, which again should not cause difficulty. The maximum silicon content added would be 0.005 per cent or practically a trace. Possibly some other than the regular type of monel sheet was used. That may contain other elements than those mentioned, and possibly might form hard combinations with the bronze to which it is added.

The Malleable Castings Industry and the War Effort

Editors' Note: The accompanying statement has been prepared by the Malleable Founders' Society and has been approved by the Ordnance Department.

THE following statement is made in order that all may know of the work of the Malleable Castings Industry in connection with the War Effort. Publicity has been given to reported production of inferior castings and to reported lack of aggressiveness on the part of the Malleable Industry. Investigation has developed the fact that only a very few of the millions of malleable castings produced for armament use have been of questionable quality, and according to Lt. Col. J. H. Frye, Material Section, Technical Division, Army Ordnance, these few have all been in the experimental phase and none to his knowledge have failed in service.

The impression of lack of aggressiveness has come about because the Malleable producers up to now have for the most part been sub-contractors and their engineering staffs have necessarily been in contact with the engineers of the prime contractor, rather than the engineers of the War Agencies. Even so, for the past three years, representatives of the Malleable Industry have been in close touch with Ordnance, Navy and Maritime Commission, in Washington and in the various Arsenals trying to be helpful to better acquaint the various branches of the services with the excellent possibilities of Malleable Iron for many applications and to assist in every possible manner in connection with its effective use.

At the present time, practically all of the facilities of the Malleable Industry are engaged in war production and the possibilities of malleable in armament are so great that it is probable much malleable will hereafter be produced under prime contract.

The Malleable Industry has every desire to make the maximum possible contribution to the War Effort. To that end, it has cooperated with the War Production Board, with Ordnance and Navy representatives in the development of a Malleable Castings Technical Committee. This Committee will assist any foundry requiring help, will cooperate with all government agencies and furnish assistance on any question of design, quality control and in general furtherance of satisfactory, proper, and effective use of the facilities of the Malleable Industry in the successful prosecution of the War.

—MALLEABLE FOUNDERS' SOCIETY

Use Auto Scrap in Cupola Charge

We have a quantity of automobile engine cylinders in our scrap pile. Can you give us the average analysis of this class of castings?

Actual analysis of the iron in automobile engine cylinder blocks will vary to some extent, depending on the size and weight and the standards prevailing in the shops of the manufacturer. Average analysis, which will serve your present purposes in making up your cupola charges follows: Total carbon 3.30 per cent, silicon 2.00 per cent, sulphur not over 0.08 per cent, phosphorus not over 0.40 per cent and usually nearer 0.20 per cent, manganese 0.55 per cent, nickel 0.60 per cent, chromium 0.35 per cent. The cupola charge for these castings contains from 15 to 25 per cent steel.

Desires High Wear Resistance in Bore

We are making a quantity of cast iron bushings 8 inches long, ranging from 1⅛ to 8 inches inside diameter with wall thickness from ¼ to ⅜-inch. Thev must be machined on the inside, and the bore must resist wear as they are thrown away after 1/32-inch wear. Can you tell us how the interior of the bushings could be hardened so that they would last longer?

You do not mention whether the machining or boring of the interior is performed to close tolerances, or just a cut taken out to provide a concentric hole which is smooth. If the latter is the case, it might be possible to cast the bushings around a chill, and then instead of machining, use an internal grinding operation to clean up the bore and get it smooth. Also instead of using a chill the composition of the iron could be changed to obtain an iron which would have the desired wear resisting properties —finishing the bore by grinding.

Another procedure would be to employ what commonly is termed "surface hardening" by using an oxyacetylene torch which will provide a circular flame, and is equipped with a following water spray or quench. The torch is drawn through the bushing at a rate of speed sufficient to raise the temperature of the wall to desired point. The water spray close to the torch forms the quench which retains the structure developed at the surface of the bushing by the high temperature.

Castings Leak When Pressure Tested

We are making some 50-pound bronze castings which form part of a filter machine. However, some of them leak when put under pressure after assembling. The castings look fine even after being machined up. Molds are vented thoroughly. Alloy used is 88-6-4½-1½.

Without actually seeing the condition of the fracture of the castings you describe it is difficult to do more than theorize or, in other words, guess as to which of several causes may account for the leakage you describe. If these castings were to be fractured at the points where they leak the structure of the metal would indicate very definitely whether your trouble was the result of insufficient feeding due to lack of risers, or whether it was absorption during melting, or caused by blows resulting from gases evolved from the molds or cores.

The fact that the castings indicate no apparent defects visible to the naked eye on machined surfaces would suggest that your trouble is either one of the first two listed, that is, either lack of feed or gas absorption during melting. Possibly you are attempting to cast these pieces without sufficient risers or without risers that have a sufficient height above the casting to insure a definite feeding.

Many bronze founders assume that the composition you are using needs no feeding and therefore use little or no risers. However, if the bronze alloy is to resist hydrostatic tests it must be fed properly. Without feeding there is no hope of producing uniformly sound castings that will not leak under pressure. On the other hand, you may be melting your metal in furnaces that are so slow that the under-burnt gases in the furnace are being absorbed by the metal after the metal has reached a red heat, and these gases are dissolved in the liquid which is later poured into the mold. As this liquid solidifies, these gases are thrown out of solution, forming small bubbles, many of which are so fine that they do not show up on a machine surface but they definitely do give rise to passageways through which leakage may occur.

If you fracture such a casting you will find tiny holes where these dissolved gases have accumulated, but the inner surface of the holes will be bright and shiny. Such bright and shiny holes indicate that they do not result from gases evolved from cores or badly vented molds. If these holes are pear shaped instead of spherical, it would also indicate that you are having some trouble from lack of feed. If the fracture is discolored but does not show any holes that are visible to the naked eye, it would indicate gas absorption during melting combined with insufficient amount of feeding. Therefore, the cure is to watch your melting and also provide the necessary risers to insure feeding. Be sure that the risers are high enough above the mold cavity to insure a sufficient pressure to force this feeding to occur. By watching your melting practice we refer to the importance of providing the fastest possible melting which means that you are burning your fuel at the highest efficiency and therefore you are having little or no under-burnt gases in the furnace. These under-burnt gases are the only ones that are dissolved by the melting metal. Furthermore, by having the highest possible melting speed you are exposing your metal to furnace gases for a minimum length of time which reduces the danger of dissolved gases.

Gray Iron Castings Show Shrinkage

We are taking heats between 900 and 2000 pounds from an 18-inch diameter cupola to pour a general run of castings. The all scrap charges are made up of automobile cylinder blocks and cylinder heads with small amounts of ferrosilicon and ferromanganese. Castings show shrinkage defects on top and in corners. We have tried adding silicon and graphite to the ladle, but the metal becomes too cold before the material is absorbed. We have added lye instead of soda ash and while this sets up a violent reaction and assists in assimilating the ladle additions, the time is too long and a skull forms in the ladle. We shall appreciate your opinion or reference to any published material that will enable us to overcome this shrinkage trouble.

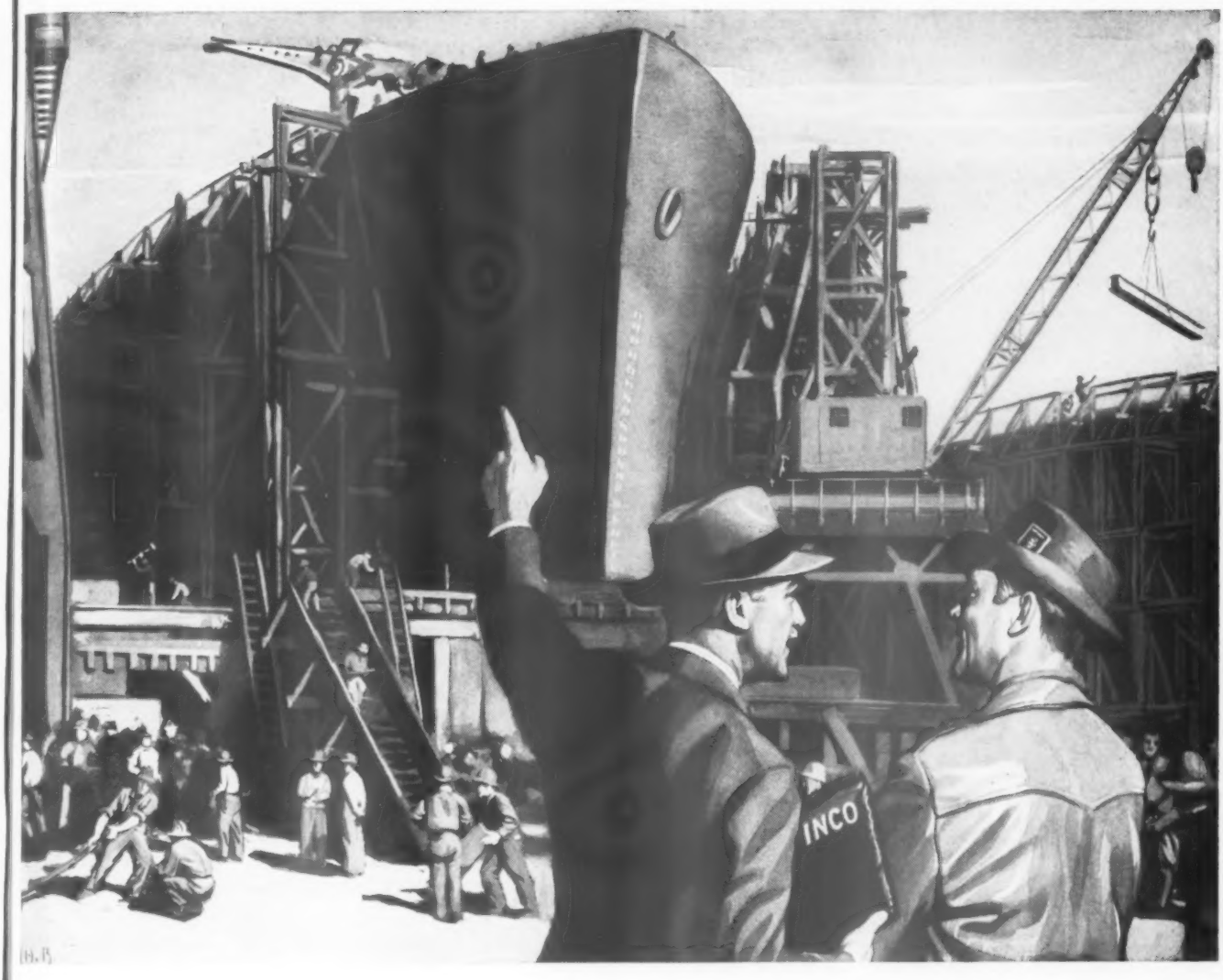
Composition of the cupola charge is responsible for the excessive shrinkage in the castings. Presumably the castings are small since the metal is melted in an 18-inch diameter cupola. Silicon content in these castings should be approximately 2.50 per cent and toal carbon about 3.50 per cent. Each time the same iron is melted it loses about 20 points of silicon. Since a reduction in the silicon content means a corresponding increase in the combined carbon content, and since high combined carbon means high shrinkage, the result of repeated melting shows up as excessive shrinkage in the castings. A complete charge of automotive scrap would require only a small addition of ferrosilicon to convert it into suitable iron. When from 25 to 50 per cent of the charge is made up of foundry return scrap—iron that has been melted and remelted—a large addition is necessary. In your case, satisfactory additions cannot be made in the ladle. The quantity of iron is too small and the temperature drops too rapidly. Alloys can be added to the charge in the cupola in lump form, or preferably in commercial briquets available for that purpose. Method of gating and feeding the castings may be contributory factor in your problem and it is suggested that you give close attention to those phases.

Apply Forced Draft To Pit Furnace

We are considering the advisability of applying forced draft to our battery of seven No. 60 crucible furnaces. We shall appreciate your advice on the proper size of main blast pipe and of the branches leading to each of the furnaces.

Application of forced draft depends on the pressure required to supply the desired combustion. If you wish to operate at low pressure (preferred by most operators) the pipe size should be larger to accommodate the necessary volume at low pressure. You probably will employ some person versed in the operation of ventilating fans to install the pipes and fan. He is qualified to decide on the proper size of pipe to deliver the

(*Concluded on page* 146)



NICKEL AIDS THE MARINE INDUSTRY

to KEEP 'EM SAILING!

"Uncle *Needs* His Ships." That sign in a shipyard, a thousand miles from the sea, typifies the fighting spirit of America's ship builders. These men will turn out new tonnage faster than Axis bombs and torpedoes can sink it.

In peacetime, their engineering-thinking created efficient power plants that pushed ships of commerce through the seven seas. They designed propelling machinery—turbines, valves, pumps and gears—to move the ship and intricate instruments to guide and guard it on its important mission.

From turbine rotors to propeller shafts, from reduction gears to condenser tubes, those engineers relied upon ferrous and non-ferrous alloys strengthened and toughened by additions of Nickel. They used the properties of Nickel to fight corrosion and fatigue.

During wartime, when uninterrupted operation of America's bridge of ships means so much, the continued and widespread use of Nickel is convincing evidence of its many advantages. Now that sea-going metals must withstand repeated demands for stepped-up performance, a little Nickel goes a long way to insure utmost dependability.

Marine engineers and designers have long known and builders and fitters... as well as repair crews at bases 'round the globe... are learning that, properly used, a little Nickel goes a long way to "keep 'em sailing."

For years the technical staffs of International Nickel have been privileged to cooperate with the men who build and operate ships of all types. Counsel, and printed data about the selection, fabrication and heat treatment of Nickel alloyed materials, is available upon request.

* *Nickel* *

Send for lists of available publications. Address your inquiries to Technical Library Service

THE INTERNATIONAL NICKEL COMPANY, INC., *67 Wall St., New York, N.Y.*

(*Concluded from page* 144)

required volume of air. Elbows or bends constitute an important factor in the construction of the air line and connections. A right angle bend develops friction equivalent to that in a long pipe line.

Some engineers claim that a right angle bend is equivalent to 40 feet of straight pipe. Therefore, a bend should be of large radius so that the change in direction of flow is gradual and the resulting friction is reduced to a point where the fan may be expected to deliver a maximum percentage of total capacity for actual consumption in the furnace. No bend should be of smaller radius than 1½ or 2 times the diameter of the pipe. Obviously a large pipe reduces the amount of frictional resistance since the layer of air next the pipe may not move, but simply become a fluid surface (as it were) through which the moving column of air passes.

Pressure from 2 to 5 ounces should be ample if the volume is sufficient to produce the desired combustion. Too much pressure will force the gases into the furnace room if the outlet to the chimney is too small. Since we do not know the pressure at which you propose to operate, we cannot offer a definite suggestion on the size of the pipe.

Assuming that the fan has a 6-inch outlet, then a 6-inch main line with a 2-inch branch leading to each furnace should deliver air to the furnaces in a satisfactory manner. A Y-connection with the main line is preferable to any other shape. Modern pipe lines of this character are sheet iron with welded branches. Joints are made as smooth as possible to reduce friction. A gate in the pipe near each furnace regulates the air volume. A little preliminary experimenting may be necessary to determine the proper speed of the fan to produce the most satisfactory pressure and volume. Finally it is desirable to draw the air supply from outside the building rather than from the inside where the atmosphere frequently is contaminated with smoke and dust from burning cores and molds.

Iron Ore Used for Making Steel

Can you give us any information on the use of high iron content iron ore with low phosphorus and sulphur content for any other purpose than simply smelting into pig iron? We understand that the ore is pulverized and then other mixtures added, to form a fluxing medium that is used in foundry work.

Your reference to the use of a high iron, low phosphorus and sulphur iron in the foundry undoubtedly pertains to its application for the production of cast steel. Basic principles for the manufacture of steel are the same whether it is poured into ingots or into castings, and at one point in the refining process, a certain amount of iron ore is added to create what is termed the "boil" wherein the bath is highly agitated. That procedure is employed to decrease the silicon, manganese and carbon contents, particularly the latter. The process is one of oxidation whereby the carbon in the molten steel unites with the oxygen in the ore to form carbon monoxide which bubbles through the bath and escapes into the furnace atmosphere.

Find Hard Spots in Brass Castings

We are sending two samples of yellow brass castings made from scrap melted and run into ingots. They have spots in them that ruins the threading tool. Castings are made on a squeezer from plated patterns. The brass is melted in an oil burning furnace. We tried a reducing flame and also an oxidizing flame, but neither seemed to help. We bring the metal up to 2250 degrees Fahr., skim and pour at 2100 degrees.

Two of the samples submitted indicate the presence of aluminum while the third does not. This suggests that apparently there is some considerable variation in the formula from which these castings are being made. Therefore, it would be worthwhile to sort your scrap more carefully before melting.

You say nothing of how these castings were gated and nothing as to whether the flasks are poured on the incline or the flat. Obviously, such thin castings as these must be cast so that the metal flows up hill and enters the mold rapidly enough to fill before it becomes too sluggish. Therefore, it would seem to be desirable to have at least two entrance gates well supplied with an ample flow of metal and have these gates located at the lower side of the mold which is inclined so that the metal flows up hill from the entrance gates. This should reduce your difficulty materially.

If these castings will serve the purpose with a small percentage of aluminum present, say not to exceed 0.2 per cent and preferably only about 0.1 per cent, that quantity would give an aluminum oxide envelope over the entire surface of the metal which would reduce drossing materially. However, the metal must be skimmed thoroughly before pouring. One of the castings submitted has tangled in the edge a chunk of slag the size of a good-sized pea; this indicates improper skimming or at least careless pouring which would account for a considerable amount of trouble of many kinds.

It might also be to your advantage to increase the amount of stock on the edge to be threaded which would permit of the removal of the first defective surface and thus leave good sound metal on which to cut the thread. That would compensate for some of the difficulties that are inherent in yellow brass. Generally it is conceded that the saving in the cost of the metals in using yellow brass is sometimes wasted in defective castings as compared with making the same castings in a cheap red brass. The temperature at which you are pouring appears to be about right, although 25 to 50 degrees higher might help a little if the metal is well skimmed each time it is poured.

Porosity Found in Bronze Casting

Our method of molding and gating a bronze ring casting 11½ inches inside diameter 13 inches outside diameter, 8 inches high, with three lugs on top for attaching it to the machine is to use a ring gate with numerous branches leading into the casting. The casting is machined inside and outside and then cut into rings ⅜-inch in cross section. Majority of the rings are perfect, but occasionally one shows slight porosity and discoloration.

Small evidence of porosity and discoloration in the sample pieces of the bronze ring were caused by a slight disturbance of the metal as it came up in the mold. In molding this particular type of casting the elaborate gating system employed is a liability instead of an asset. All the metal to fill the mold must flow in at the bottom and then rise up between the walls of the mold and core. Molten metal develops a film over the top surface and naturally the thickness of the film increases with the distance traveled and with the drop in temperature. Where the metal boils or kicks even mildly in the mold, a greater or lesser volume of gas bubbles is formed. Each one of the gas bubbles has a thin shell and in many instances is absorbed by the surrounding metal.

In some instances, and this applies particularly to metal scum floating on metal in restricted areas, the bubbles remain intact either attached to the wall of the mold or core, or trapped in the viscous metal. This is what happened to your ring. For some reason the first metal did not lie quietly in the mold. The amount of gas absorbed by the metal was small, but it formed a number of small cavities. The disturbance also caused the discoloration in certain areas. Top pouring presents certain advantages over bottom pouring for this casting. The mold may be made either in green or dried sand. No cope is needed on top. The metal is poured directly into the top of the ring at any desired point.

It is advisable to flare the edge of the ring at the point selected as a pouring basin. The metal is poured as fast as possible to prevent cold shuts and to bring any scum or film to the top. Hot metal entering the top obviously does this work better than metal entering the bottom and gradually growing colder and more viscous as it rises in the mold. As a final precaution, a workman dips a hot steel rod in the metal as it stands in the mold and whirls it around before the metal solidifies. The theoretical solution to the problem is to provide a mold that does not produce even the slightest disturbance in the metal and the consequent formation of small patches of bubbles. The practical solution is to anticipate some slight disturbance, vent the mold and core to a greater extent than usual and then pour the metal into the open top. Incidentally this feature of nonferrous foundry practice is covered in detail with many others in *Gates and Risers for Castings*, by Pat Dwyer.

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WRITE FOR BULLETIN G-842

BUELL ENGINEERING COMPANY, Inc.

14 CEDAR STREET, NEW YORK

BUY WAR BONDS AND MAKE THE AXIS BITE THE DUST

MEN ...of Industry

R. J. SWARTOUT has been elected vice president, Belle City Malleable Iron Co., and its subsidiary, Racine Steel Castings Co., to succeed the late J. M. Stone. **L. W. Brann** has been elected treasurer, to succeed Stanley Kitto, recently deceased. **Harry Thorson,** for the past 9 years the company's purchasing agent, has been elected assistant treasurer.

Mr. Swartout has been identified with the Belle City company and its subsidiary since 1919 when he served as office manager. Prior to that time he was associated with International Harvester Co. at Chicago. In 1926 Mr. Swartout was appointed assistant sales manager, and since 1935 he has served as sales manager.

Mr. Brann was born in Baileys Harbor, Wis., and was graduated from the University of Wisconsin School of Commerce in 1922, and has recently completed the C.P.A. requirements of the state. Prior to accepting the position as treasurer of the Belle City Malleable Iron Co., Mr. Brann was connected with the United States government as chief auditor on government contracts.

Mr. Thorson has been associated with the company since 1923 when he served as clerk in the accounting department. He will combine the duties of purchasing agent with those of assistant treasurer.

♦ ♦ ♦

Arthur B. Parnall has been appointed treasurer of the Osborn Mfg. Co., Cleveland. Mr. Parnall has been connected with Osborn for the past 17 years, and has successively held positions of chief accountant and controller.

♦ ♦ ♦

Jay J. Seaver, since 1941 associated with Day & Zimmerman Inc., engineers, Philadelphia, has been elected a vice president of that organization.

♦ ♦ ♦

William H. Worrilow, president, Lebanon Steel Foundry Co., Lebanon, Pa., has been elected a director, Armstrong Cork Co., Lancaster, Pa.

♦ ♦ ♦

Daniel E. Weiss, recently was honored by fellow molders at the Newark Stove Co., Newark, O., for his 50 years of continuous service with that company.

♦ ♦ ♦

Jones A. Elmes, has been appointed plant manager, Jones Engineering Co., Ellwood City, Pa. Mr. Elmes formerly was chief engineer, Keystone Driller Co., Beaver Falls, Pa.

♦ ♦ ♦

William H. Harman has been elected president, William Sellers & Co. Inc., Philadelphia. He has been associated with Baldwin Locomotive Works since 1928, during the past 5 years serving as vice president in charge of sales for the Baldwin group. From 1915 to 1928 he was president, Southwark Foundry & Machine Co., a division of Baldwin. Mr. Harman will continue as a director of the Baldwin Locomotive Works.

♦ ♦ ♦

Frank O. Parker, formerly sales manager, Acme Steel & Malleable Iron Works, Buffalo, has been appointed a vice president, Pratt & Letchworth Co. Inc., Buffalo.

♦ ♦ ♦

James L. Francis has joined the metallurgical staff, Meehanite Metal Corp., New Rochelle, N. Y. He formerly was connected with the Vulcan Foundry Co., Oakland, Calif.

♦ ♦ ♦

Julian W. Nash, chemical engineer, has been appointed to the research staff, Battelle Memorial Institute, Columbus, O., and has been assigned to its division of nonferrous metallurgy.

♦ ♦ ♦

Axel S. Hellstrom, formerly associated with the Broden Construction Co., subsidiary of the Wean Engineering Corp., recently has become a member of the staff of the Parsons Engineering Corp., Cleveland.

♦ ♦ ♦

Edward A. Beidler, chemical engineer, has been appointed to the research staff, Battelle Memorial Institute, Columbus, O., and has been assigned to its division of nonferrous metallurgy. Mr. Beidler is a graduate of Ohio State University.

(*Continued on page* 150)

L. W. BRANN

R. J. SWARTOUT

HARRY THORSON

A. B. PARNALL

WOODWARD IRON COMPANY

WOODWARD, ALABAMA

America's Largest Completely Integrated and Entirely Independent Merchant Iron Producer

(*Continued from page* 148)

from which school he holds bachelor of chemical engineering and master of science degrees. He is a member of the American Institute of Chemical Engineers, American Chemical Society, and Sigma Xi.

♦ ♦ ♦

Gordon LeFebvre, vice president and general manager, Cooper-Bessemer Corp., Mt. Vernon, O., has been elected president to succeed **B. B. Williams,** who declined nomination for re-election. Mr. Williams will continue in active capacity with the company, also as chairman of the board and chairman of the executive committee.

Mr. LeFebvre, who has been associated with the Cooper-Bessemer company for the past 19 months, is a graduate of Virginia Polytechnic Institute, and attended the U. S. Military Academy at West Point. After an association with the Norfolk & Western Railway, he became affiliated with E. I. du Pont de Nemours & Co. In 1919 he joined General Motors Corp., following which he became associated with American Locomotive Co. in charge of the diesel engine division, the position he held prior to joining Cooper-Bessemer Corp. Mr. LeFebvre has served as a member of the Joint War Production committee, Economic Defense Board, Washington.

♦ ♦ ♦

E. J. Metzger has been appointed works manager of the Superior plant, Wellman Bronze & Aluminum Co., Cleveland. Mr. Metzger has been active in the foundry industry for the past 12 years. During the past 4 years, he served as general superintendent of foundry and machine shop for Falcon Bronze Co., Youngstown, O.

♦ ♦ ♦

Raymond R. Wicklein has become associated with Bohn Aluminum & Brass Corp., Detroit, as magnesium superintendent at the company's No. 3 plant. Mr. Wicklein left high school in 1909 to learn foundry practice from his father who was connected with the Excelsior Brass Works, Reading Pa. He served an apprenticeship in molding, metal patternmaking and machine shop practice, and in addition to traveling in order to gain experience, he took a night school course in planning and organization at Temple College, Philadelphia. Mr. Wicklein has served as superintendent of the Reading Brass Works, Moore Brass Works, Stanley G. Flagg & Co., Phoenix Brass Fittings Corp., Lovell Dressel Co.,

HARRY C. WANNER, who recently became president, Headford Bros. & Hitchins Foundry Co., Waterloo, Iowa, as reported in the May issue of THE FOUNDRY

and for the three years prior to his present position, served as a consultant for several foundries in the New Jersey and Pennsylvania districts.

♦ ♦ ♦

Charles E. Seman has been appointed Eastern representative for the National Founders Association, Chicago, with offices in the Grand Central Terminal Building, New York. He succeeds R. A. Riggle, who resigned recently after 30 years with the association, to become affiliated with the personnel department, Aluminum Forgings Corp., Erie, Pa. Mr. Seman was graduated from Ohio State University in mechanical engineering in 1923 and has had much practical experience in iron and steel casting procedure. He also has served as a consultant in the use of foundry sands. Recently he was associated with Hougland & Hardy Inc., Evansville, Ind. Previous connections were with Bonney-Floyd Co., Columbus, O., and U. S. Radiator Corp., Detroit.

♦ ♦ ♦

D. E. Whitehead, former superintendent, Wright Aeronautical Foundries, Cincinnati, has been named plant superintendent, National Bronze & Aluminum Foundry Co., and National Aluminum Cylinder Head Co., Cleveland.

♦ ♦ ♦

Louis C. Beale, a recent graduate in chemical engineering, Ohio State University, has been appointed to the research staff of Battelle Memorial Institute, Columbus, O., and has been assigned to its division of nonferrous metallurgy.

♦ ♦ ♦

John W. Haddock has been elected president, Farrel-Birmingham Co. Inc., Ansonia, Conn. Mr. Haddock formerly was vice president, Sullivan Machinery Co., Claremont, N. H., and Michigan City, Ind. He started his industrial career as a stock clerk in the Michigan City plant of that company.

♦ ♦ ♦

Henry D. Miles, formerly president, Buffalo Foundry & Machine Co., Buffalo, has been elected chairman of the board. **Charles W. Pearson,** formerly executive vice president, succeeds Mr. Miles as president. **Milo T. Siverling** has been elected executive vice president and general manager, and **L. Clayton Vallier,** formerly treasurer, has been elected secretary and treasurer.

♦ ♦ ♦

C. C. Hermann has been appointed general manager, Claude B. Schneible Co., Chicago, and **L. C. Beers** has been appointed sales manager. Mr. Hermann joined the Schneible organization in 1937

(*Concluded on page* 152)

GORDON LEFEBVRE

R. R. WICKLEIN

C. E. SEMAN

E. J. METZGER

Three-Way Savings with TRULINE BINDER!

Faster Ramming. In the first place, Truline is easy to handle and mix. It develops an easy-flowing core sand with readily controlled green strength that has excellent core-box workability and rams easily to give smooth cores.

2 Faster Baking. Another advantage of Truline is that it forms a strong bond at a relatively low temperature—thus saves time in the baking oven.

3 More OK Castings! Truline burns out readily, allowing the core to collapse and knock out easily. This results in less clean-up time and, in addition, helps prevent hot-tears and similar defects.

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(*Concluded from page 150*)

as sales engineer in charge of the Philadelphia office. In 1941 he became chief engineer of the company. Previously, he had been connected with the engineering department, John Deere & Co. in the

C. C. HERMAN

Moline, Ill., and Waterloo, Iowa, plants. Mr. Beers also joined the Schneible company in 1937, being district sales representative in Detroit and in New England before entering the Chicago office as assistant sales manager.

♦ ♦ ♦

Albert S. Rairden has been appointed sales manager, Riehle Testing Machine Division, American Machine & Metals Inc., with headquarters at East Moline, Ill. Mr. Rairden has been identified with the steel industry for the past 20 years. For the past 10 years he was associated with Wickwire Spencer Steel Co. where he was in charge of sales engineering and sales of wire rope. Prior to that he was chief engineer of American Cable Co. and Hazard Wire Rope Co. Pre-

A. S. RAIRDEN

viously he was production superintendent of wire rope plants, American Steel & Wire Co., Worcester, Mass., and New Haven, Conn. Mr. Rairden was born in Batavia, Java, where his father was American consul for 35 years. He was graduated from Massachusetts Institute of Technology.

♦ ♦ ♦

Thomas N. Armstrong, metallurgist, development research department, International Nickel Co., New York, since 1935, now also is serving as part-time member of the staff, War Metallurgy committee, National Academy of Sciences, National Research Council. Mr. Armstrong was graduated from the University of Kentucky in 1927 with a degree in metallurgical engineering and was employed by the Andrews Steel Co., Newport, Ky., and as metallurgist in the Norfolk Navy Yard, Portsmouth, Va., before joining the staff of the International Nickel Co. His principal responsibilities with the War Metallurgy committee are the direction of research on steel foundry products and on the low temperature properties of metals—two major fields in which the committee is directing research projects.

♦ ♦ ♦

Herbert M. Rich Jr., has been appointed district manager in New York for Electro Metallurgical Sales Corp. He

H. M. RICH JR.

formerly was connected with Hickman, Williams & Co. at Detroit where he had been in charge of the sale of ferroalloys, pig iron and metallurgical coke. Mr. Rich is a member of the American Foundrymen's Association and the American Society for Testing Materials, and is a member of the committee on cast iron of the latter.

Marks Anniversary

H. K. Ferguson Co. Inc., industrial engineers and builders with offices in Cleveland and New York, is celebrating its twenty-fifth anniversary. The company, organized during the last war, recently was awarded the Army-Navy "E" for its part in designing and building a large plant for Chemical Warfare Service at Denver. The plant was completed several months ahead of schedule.

Apprentice Contest Winners Named

Winners of the national apprentice contest of the American Foundrymen's Association were announced by Norman F. Hindle, assistant secretary, at the annual meeting of the association held during its convention in St. Louis. First, second and third place winners in the four divisions are:

Patternmaking: Ralph Peterson, Central Pattern Co., St. Louis; William Waddicor, Jr., Brown & Sharpe Mfg. Co., Providence, R. I.; Brandon Elias, International Harvester Co., McCormick Works, Chicago.

Steel molding: George Metzler, Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.; Clarence Kasper, Continental Roll & Steel Foundry Co., East Chicago, Ind.; Arthur Tazalla, Maynard Steel Corp., Milwaukee.

Nonferrous molding: Anthony Ivancich, Standard Brass Works, Milwaukee; Edward H. Drebus, Universal Foundry Co., Oshkosh, Wis.; Gregory Reindl, Wisconsin Aluminum Foundry Co., Manitowoc, Wis.

Gray iron molding: L. R. Kinsinger, Caterpillar Tractor Co., Peoria, Ill.; Theodore H. Anderson, Brown & Sharpe Mfg. Co., Providence, R. I.; Michael Slivka, Hill-Acme Co., Cleveland.

Employe Suggestions Speed Production

More than 500,000 extra man hours were added to the nation's war effort in 1942 through suggestions made by employes of the Westinghouse Electric & Mfg. Co. Workers in 25 manufacturing plants and 14 offices and repair shops submitted 22,788 ideas to speed production, to save materials or to increase safety. Of these ideas, 36.4 per cent were adopted. There were 1500 more suggestions adopted during 1942 than in 1941. The suggestion system paid out a total of $70,380 in 1942 compared with total awards of $46,415 in 1941. Awards ranged from the $2.50 minimum payment to $1397 the largest single amount paid in the plan's 33-year history.

Book Review

The Industrial Guard's Manual, by Harry Desmond Farren, 95 pages; published by National Foremen's Institute, Inc., Deep River, Conn. Price $1.25.

Established rules for guard training presented in this manual might be called the cardinal rules. They cover general subjects with which all guards should be familiar. Obviously the scope of the guard's duties will vary to a considerable extent, depending on the size of an individual plant and the number of employes.

Subjects covered under eight chapter headings include: Public and worker contact, riots, panic, mobs and crowd behavior; self protection; first aid; fire protection; sabotage and espionage; plant protection; bombs and infernal machines

No. 90 IRON-OXIDE

HAVE YOU TRIED IT IN YOUR CORE SAND MIX?

Grey iron and steel foundries everywhere recommend and use No. 90 IRON-OXIDE in their core sand mixtures because it prevents core burning, veining and penetration. Because it prevents core sand failures, improves castings and reduces cleaning costs! No. 90 IRON-OXIDE added to the extent of only 2% by volume of sand, increases high temperature strengths of core sands and speeds war production! *Inexpensive—write today for specifications and SAMPLE!*

TAMMS No. 100 CORE EQUIPMENT Liquid CLEANER

Cleans metal core boxes, drier plates, blow plates, core vents, etc., without need of scouring or scraping. It's fast acting, thorough, won't harm metal—"SOAKS 'EM CLEAN" in half the time. Investigate!

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Stainless, Special Alloy and Carbon Steel Castings
LEBANON, PENNA.

Mr. T. J. Peterson, President,
Tamms Silica Co.
228 North LaSalle St.
Chicago, Ill.

December 3, 1942

Dear Sir:

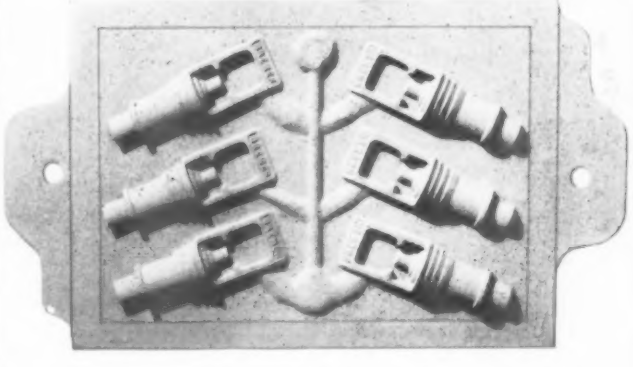
We have your letter of November 27th, acknowledging our order for one carload of #90 Iron Oxide and also requesting information as to how we are using this material.

We have found your material to be of great value in increasing the high temperature strengths of our core sands, in which it is used to the extent of 2% by volume of the sand. It is every bit as satisfactory for this purpose as some of the proprietary materials sold at a much higher price.

We do not mind if you care to use our name in your sales effort to increase the use of this material.

Very truly yours,
LEBANON STEEL FOUNDRY
H. D. Phillips
Plant Man.

HDP:EMS



TAMASTONE PATTERN COMPOUND

Steps up those urgent war orders! Speeds production as much as 400%. Cuts costs 75%. Converts loose and metal gated patterns into one or more TAMASTONE Match Plates that are good for thousands of impressions. Many foundries report better results than with metal plates. TAMASTONE gives micrometer accuracy on separate cope and drag patterns, too. Order Today!

Other TAMMS Products Include—

- **TAMMS LIQUID PARTING**—No dust, just spray on and dry with air hose. No sand sticks to pattern, exact detail every time. No "build-up." Full day runs without recoating.
- **METALINE**—For wax fillets, stops hot sand from sticking.
- **PYRAMID SKIMMERS**—Eliminates metal contamination.
- **PYRAMID PYROMETERS**—For non-ferrous foundries.

Write for Catalog Today!

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Among the WEST COAST Foundries

BY A. H. ALLEN
Detroit Editor, The Foundry

POPULAR conception of the West Coast among easterners and middle westerners has been pretty well wrapped up in the words "orange groves, playgrounds and movie stars". Actually nothing could be further from the truth, and not just since the inception of the war boom, either. The West Coast has had a substantial metal-producing and metalworking industry for a good many years, in such fields as oil well machinery, mining machinery, logging and lumbering machinery, etc. The war has simply thrown the emphasis—and in no small way—to the fields of airplane production, shipbuilding, ordnance and the light metals.

EDITORS' NOTE: Art Allen, Detroit Editor of THE FOUNDRY, has been on a special assignment for the past 6 weeks visiting industrial operations on the Pacific Coast, thus necessitating the temporary suspension of his regular department, Among Detroit Foundries. In lieu thereof, some of his impressions of West Coast foundry activity are presented herewith.

In all of these, foundry activity has come along apace, and all the way from San Diego to Seattle there are literally hundreds of plants, new and old, engaged in casting aluminum, magnesium, brass, bronze, gray iron, malleable and steel.

Principal activity is naturally in the steel field, because of the heavy demands for ship castings and ordnance parts. Fortunately there are ample supplies of the finest type of steel plate scrap available from nearby shipyards, all of it low in sulphur and phosphorus, so the problem of raw material for melting is a simple one. Plenty of low-cost electric power generated by water power likewise is available, so electric furnace melting is the rule.

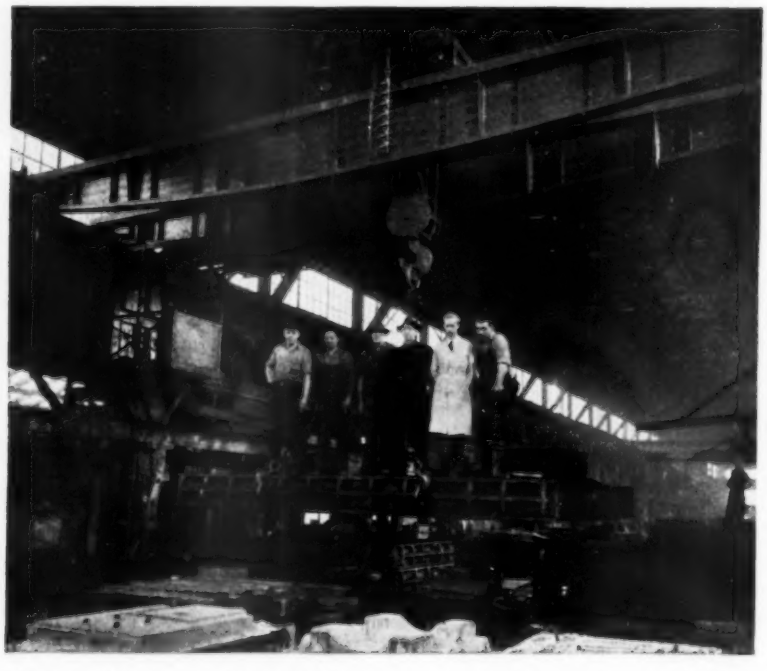
It was not so long ago that even the top-ranking admirals of the maritime commission were positive that ships could not be built on the West Coast. They said the shipbuilding industry there was dead, that the "know-how" was lacking, that shipbuilding should be concentrated in established eastern yards. How utterly wrong they were is now being proved, for up and down the 1500 miles of the West Coast are shipyards after shipyards, working on everything from corvettes to destroyers and cargo ships and aircraft carriers. Two yards alone—California Shipbuilding Corp. and Oregon Shipbuilding Corp., both under direction of the Kaiser interests, have launched 350 vessels since they started a couple of years ago, and a dozen other yards have been sliding new ships down the ways at an undreamed-of pace to bring total launchings to something like 700 or more. This is a spectacular thing when you consider that as recently as 5 years ago the few shipbuilders who were still struggling along on the Coast enthused over the announcement that a millionaire was going to have a $150,000 pleasure yacht built on the West Coast!

What all this furious shipbuilding activity means from the standpoint of foundries easily can be imagined. Each vessel requires literally hundreds of steel castings for structural members, capstans, cleats, rudder yokes, stern posts, struts, etc. Gray iron castings in quantity are required for construction of steam engines to power the ships. Brass and bronze castings are needed in wide variety for ship installations, propellers and accessories.

Three of the newest steel foundries to be installed on the Coast are those

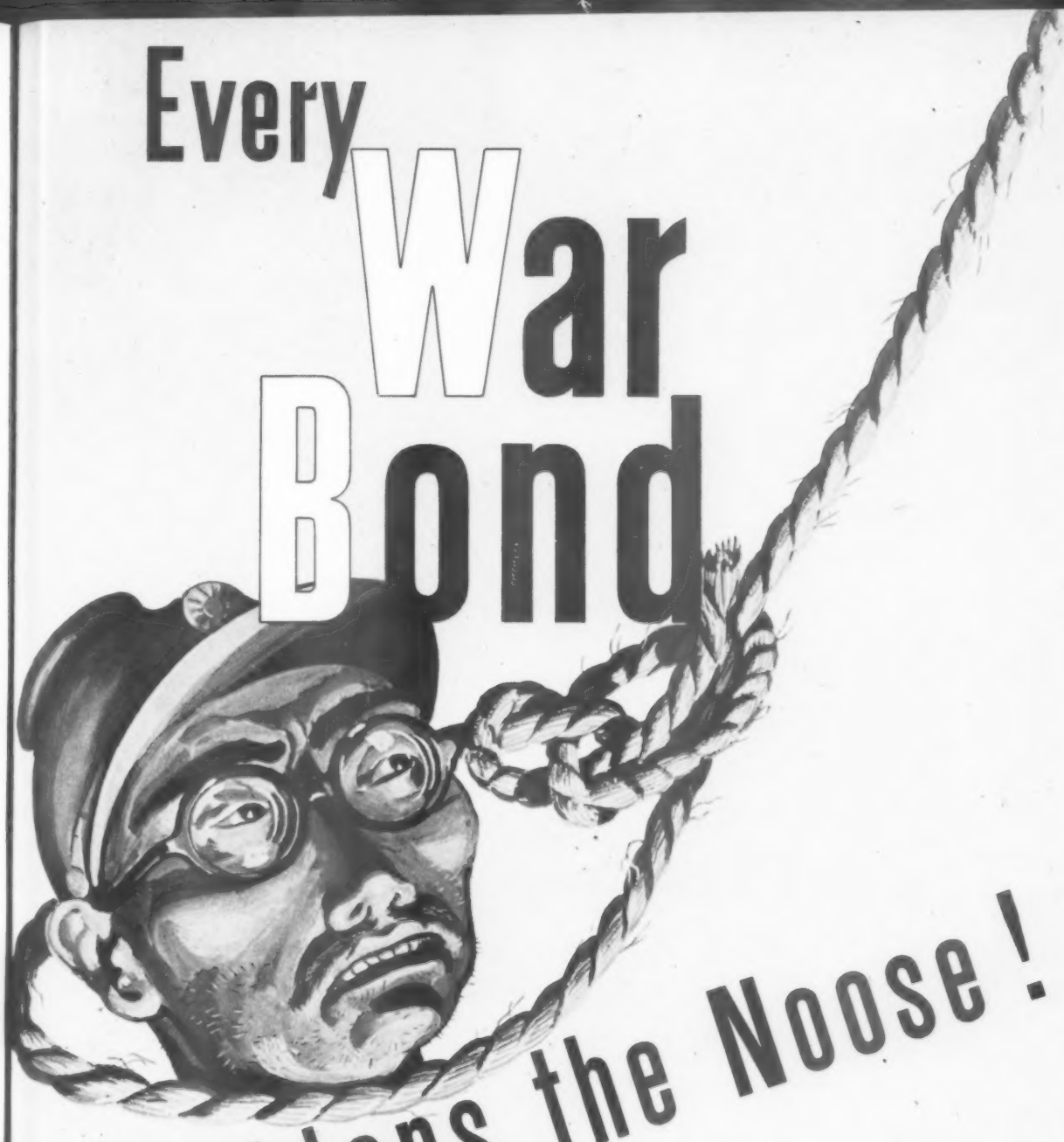
(*Concluded on page 158*)

Builds 20-Ton Crane From Salvaged Parts



Instead of waiting 18 months for delivery of a new overhead crane for its Iron Plant Division, Oakland, Calif., General Metals Corp. built the 20-ton unit shown here largely from scrap and salvaged parts. The company's Oakland Maintenance Division completed the job in 3 months but was required to comb a number of states for some of the crane's parts. Overhead beams were located in an abandoned power house in Salt Lake City; the hoist motor came from a damaged crane at Shasta dam; a Washington lumber mill supplied another motor; a third motor came from a deserted rock quarry in Nevada; and the hoist brake was salvaged from an old gold mine hoist in California. Hoist drum, sheaves and gears were designed, patterned and cast in Oakland

Every War Bond Tightens the Noose!



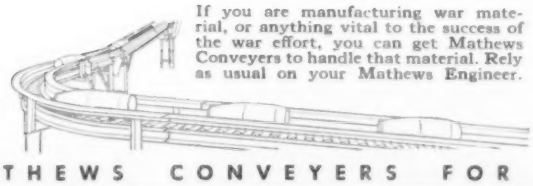
American money and machinery are slowly but surely weaving the noose which will strangle the war effort of enemy nations. Every Bond purchased hastens the day of reckoning for Hitler and Hirohito, and all the brutality and murder they represent.

The men and women in the Conveyer Industry are behind this strangling program in two vital ways —

First, by participating in War Bond buying plans which help our Government to finance the purchase of war material, to train fighting men, and to keep our national economy on as even a keel as possible —

Second, by an all-out production program to speed the engineering and manufacturing of conveying equipment for the faster production and movement of the implements of war.

The cost of the war increases each day. So must the purchase of Bonds increase day after day, until our enemies are beaten completely and finally.



If you are manufacturing war material, or anything vital to the success of the war effort, you can get Mathews Conveyers to handle that material. Rely as usual on your Mathews Engineer.

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Changing "Mountains" with Wheelabrator

THE industry-wide change-over to airless Wheelabrator abrasive blasting has been literally phenomenal. The acceptance of this process by more than 2000 plants is the result of many cost-cutting advantages, of which exceptional cleaning speed is a prominent factor. Read the typical examples of Wheelabrator performance shown on these pages.

ARMY E NAVY

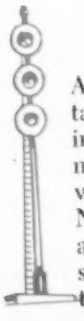
TANK DOORS

Wood Bros. Thresher Co., Des Moines, Iowa, using a 6 ft. Wheelabrator Tablast, is cleaning tank doors weighing 240 pounds each, as follows:

Present Cleaning Time: Tops—3 min.; Bottoms, 7 minutes

Former Cleaning Time (using an Airblast Table): Tops—45 minutes; Bottoms—1 hour.

RAILROAD EQUIPMENT



A 24 hour job for 2 sandblast tables and 4 operators in cleaning, steel castings, signal mounts, etc. at General Railway Switch Co., Rochester, N. Y., was reduced to 16 hours and a single operator by installing a 36 x 42" Wheelabrator Tumblast.

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METAL WASHING EQUIPMENT

To completely "round out" our service in the metal cleaning field, we have organized a special division for the design and manufacture of metal washing machine equipment. Simplified and improved. New design principles used. Send us your problems.

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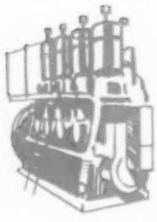
DIESEL ENGINE PARTS



The 27 x 36" Wheelabrator Tumblast used by Detroit Diesel Engine Div., Detroit, Michigan is cleaning 250 diesel engine parts in 5 minutes, whereas it previously required an hour to clean 50 pieces in a sandblast cabinet; and from 25% to 50% had to be touched up by handblasting because of imperfect cleaning on the interior.

RIFLE PARTS

Cleaning 13 tons of rifle parts in 16 hours is the big job being done by a 27 x 36" Wheelabrator Tumblast at High Standard Mfg. Co., Hamden, Connecticut. 60 hours were previously required to handle the same amount of work in a sand blast barrel.

BRASS VALVES

Brass valves, formerly were cleaned by power driven wire brushes at H. Belfield Co., Philadelphia. Work that had required two men eight hours to do is now being cleaned in a 20 x 27" Wheelabrator Tumblast in 1½ to 2 hours. The finish is now uniform over the entire surface and casting interiors are thoroughly scoured out, whereas wire brushes couldn't reach them.

AMERICAN
FOUNDRY EQUIPMENT COMPANY

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ALSO MANUFACTURERS OF: **Sand Blast Equipment • Dust Collectors**
Sand Cutters • Core Rod Straighteners

(*Concluded from page* 154)

of the General Metals Corp. at Oakland; the Columbia Steel Corp. (U. S. Steel subsidiary) at Pittsburg, Calif.; and Pacific Car & Foundry Co. at Renton, Wash., near Seattle. The first of these is a $2,500,000 plant for producing navy castings. Included in the elaborate equipment is a 1,000,000-volt x-ray machine for castings inspection. The Columbia foundry is also for navy work and has both open-hearths and a 25-ton electric furnace for melting, in addition to million-volt x-ray equipment.

General Metals, now controlled by Transamerica Corp. and the Bank of America, has extensive plants at Los Angeles as well as at Oakland. At the latter location, in addition to the steel foundry just mentioned, are forge shops, a malleable foundry and a gray iron foundry. Bank of America, incidentally, also controls the old Enterprise Foundry Co., now known as the Enterprise Engine & Foundry Co. Foundry operations have been moved to a plant in South San Francisco, supplying castings to the engine division which is building diesel engines for ship installation. Incidentally, these engines are reported to be using the Campbell, Wyant & Cannon cast crankshaft.

The new steel foundry of Pacific Car & Foundry Co. in the Seattle district melted its first metal April 15 and is rapidly moving into production, aiming at output of about 2000 tons a month. Two electric furnaces have been installed, one a 4½-ton and the other a 2-ton, but both operated at well over these ratings. The entire plant is unusually well outfitted, with complete mechanical sand handling and reclaiming systems, seven molding machines, a sandslinger, dust collectors, eleven annealing furnaces, sandblast cleaning equipment, concrete sand storage silos with mechanical feed.

The foundry is so new and well equipped, compared with an older foundry operated at the plant until recently, that the present supervisory personnel actually appears a little awed by the magnificence of it all. Production covers a wide variety of carbon and alloy steel castings, about half for ship requirements and half for ordnance. The Pacific Car company currently is building the M-4 medium tank and only recently was the news permitted to be published, although the tank operation has been under way for over a year. The tank is the same as those built by Chrysler, Ford and Fisher Body, with a cast upper hull. Hull and turret castings are shipped in from the East at present, but plans are under way to cast the turret in the new steel foundry, and eventually an attempt may be made to cast the large upper hull.

There are hundreds of subcontractors co-operating with Pacific Car on the tank job, most of them in the Northwest, although foundries, machine shops and other interests as far down the coast as Los Angeles also figure in the picture, particularly in respect to supplying various elements in the track mechanism.

Down at Los Angeles the South Gate division of General Motors Corp., where formerly all the new Buicks, Oldsmobiles and Pontiacs sold on the West Coast were assembled from knocked-down units shipped in from GM plants in the middle west, is busily engaged in turning out the M-5 light tank, identical with the one Cadillac is producing in Detroit. Over 50 per cent of the cost and 61 per cent of the weight of the California-built tank comprises materials or supplies made or purchased in the Los Angeles area.

Near San Francisco is the reborn Joshua Hendy Iron Works which Charles E. Moore, dynamic West Coast machinery dealer and industrialist, and Henry J. Kaiser bought up for a song a few years ago and converted and expanded into a leading builder of steam engines for Liberty ships. It is reported that at the time the business of the company had dwindled into almost nothing except for supplying a few repair parts for mining machinery. Rescued from this situation, the company has built up four or five new shops, boosted its employment to around 3000 and has installed some of the finest machine tool equipment on the Coast.

Joshua Hendy works has erected a new gray iron foundry for casting some of the heavier parts of the large steam engines built for the C-2 and C-3 ships. Iron is melted in two medium-size cupolas and carried to pit molds by overhead traveling crane. The pits are disposed along both sides of a central track running the length of the main foundry bay. Traveling on this track is a sandslinger which thus can serve any of the pits, speeding up molding operations immeasurably.

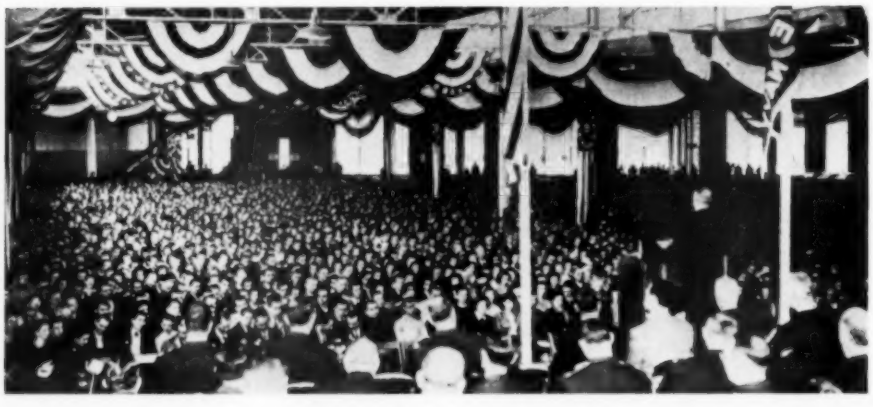
The coke problem is one which always has been troublesome for iron foundries on the Coast. There are no coal coking plants on the Coast, with the exception of the new Kaiser plant at Fontana, Calif., only recently placed in operation and using Utah coal. Some coke is made from petroleum residues and it is the material which foundries have used largely, although Joshua Hendy is receiving some Kaiser coke.

Postwar Outlook Uncertain

While there are many planners and dreamers throughout the ranks of West Coast metals industries, the hard-bitten industrialists who face the facts are not kidding themselves that the current level of production activity can continue after the war. Take Earle Doran, president of the Doran Co. in Seattle, who is doing a whale of a job casting a wide variety of large propellers for Liberty ships, corvettes and other craft, operating in a plant with only the barest essentials in the way of equipment, yet turning out an almost unbelievable volume of "wheels". He says he will give the shipbuilding industry on the Coast about another 18 months to 2 years, and then it will fold up completely. This may sound pessimistic when you stack it up against the vast stretches of new shipyards, many of them avowedly of a permanent type of construction, built up in recent years, but nevertheless Mr. Doran is a good operator, and there are many who, much as they hate to do so, will respond, "Amen," to his observations on the future of Coast shipbuilding.

So, if shipbuilding does fold up when the war terminates, it will certainly mean that 60 or maybe 75 per cent of current foundry activity will have to collapse with it. Knock out ordnance requirements along with this and the picture looks gloomy. Certainly there will be some resumed demand for castings to be used in oil field, mining and lumbering equipment, but this is only a drop in the bucket compared to current consumption. Furthermore, there will be the many new shops completed in recent months with modern equipment which puts them far ahead of their smaller competitors in a normal peacetime economy. The small shop operators know this full well, but their attitude at the moment is to get the job done and let the future take care of itself.

"E" Award Conferred on Johns-Manville



Comm. A. S. Kibbee, U. S. Navy, addressing the more than 4000 Johns-Manville Corp. workers and their families, who attended the Army-Navy "E" award ceremonies at the company's Manville, N. J., plant on March 24. The flag was accepted on behalf of the workers by John E. Begert, plant manager, from Maj. Gen. Thomas E. Robins, chief of the Construction Division, O.C.E.

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the adventures of BILL

BY PAT DWYER

Drawings By RICHEY

DO YOU remember," said Bill, "certain tough little terriers Horatio Alger used to write about in those far away days when you and I went to the school house every day—well, nearly every day—and valiantly opposed every effort of the dear teacher to plant any seeds of knowledge into our vacant little minds. Mr. Alger's laudable purpose was to show that a boy with the proper spirit and ambition was bound to rise to the top despite poverty, hunger, rags and frost bite. The hero started life in a packing box under one of the arches of the Brooklyn bridge and before he was of voting age he either owned the bridge or collected toll from every passenger and vehicle that crossed the famous structure."

"Your memory," I said, "is missing on at least three cylinders. Mr. Alger's stories were based solidly on the cardinal virtues with particular emphasis on honesty. His heroes willingly, even cheerfully, would die in preference to accepting a penny to which they were not properly entitled. The practice of buying and selling the Brooklyn bridge was developed in later years by a tribe of slippery minded, well dressed crooks who never had read the inspiring works of the great author. Their occasional light reading was confined to the *Police Gazette*, wild cat mining reports and racing forms."

"Well," said Bill, "I'll tell you. I must admit that I am kind of hazy on the subject. It may be that I did not interpret the great lessons correctly. The general impression I retain is that if a boy had the proper combination of guts and gumption he could make his own way without wasting half his young life in the dreary confines of a school room. That idea made a great hit with me since it confirmed a belief I held from the first day I crept timidly into a scholastic institution. Seems to me most of Mr. Alger's boys either never went to school, or quit in the second grade and went out on the firing line to do a man's work."

"Did you ever hear of the Spartans?"

"Can't say as I did. I knew a fella in 106 one time, who went by the name of Scathan, but I never discovered whether that was his real name, or was given him because his face, by some slight stretch of the imagination, bore some resemblance to that of a herring."

"The Spartans lived in Greece hundreds of years before the Christian era and therefore in all probability were not even remotely connected with your down east friend. I think it is also safe to assume that they did not speak the Gaelic. The Greeks had a word for everything, even a herring."

"Supposing they had? Why bring that up?"

"Your flippant reference to tough little terriers suggested that you might be interested in a method by which the Spartans maintained their warlike supremacy for many centuries. When a Spartan baby was a week old, his father grabbed him by the hind legs and threw him against the nearest wall. If the baby hung on with fingers and toes, he was considered worthy to be retained as a member of the family. If he failed to grip he was entered on the record as a candidate who did not pass the physical examination. He was turned over to the garbage collector. Am I to understand, my good man, that you favor the Spartan method of bringing up the youth of this Great Republic?"

"Well," Bill said, "I would not care to go that far, but the system has certain meritorious features. If the fathers—provided they had fathers—applied that test to a few of the present maniacal war lords when they were babies, the world would not be in the mess it is in today."

"Ease off on the main sheet and bring her back on her course. I should like to point out to you that the average baggy eye and baggy front citizens whose memory extends back 50 years or more, easily will recall how Horatio Alger's intrepid little half orphans, the only sons of their widowed mothers, shouldered the family burdens at the mature age of seven or eight. They sold papers and blacked boots, picked up pins and cheerfully ran all kind of impossible errands with one hand while manfully beating the wolf away from the door of the humble, but spotlessly clean cot, with the other hand.

A good man can sell anything

"After four years of this character and muscle building experience on a diet of weak tea, soda crackers and turnip tops, the boy is ready for the great adventure. At the risk of life and limb, our hero 47 inches in height and weighing 67 pounds in his neatly patched high water pants grabs the bridle of a foaming, runaway horse attached to a light phaeton and saves the village banker's terrified and beautiful 15 year old daughter from a sudden and horrible—ah—demise. Mr. Alger always chose his words with nice care and discrimination. An artist's conception of the thrilling episode usually adorned the front cover.

"To show his appreciation of the noble act, Lillie May's father gives Tim—for that is indeed our hero's name—Tim Tilly—gives Tim a job in the bank, sweeping the floor, washing the front window, operating the letter copying press and dusting the cobwebs off the mortgage files in the big iron safe. In his spare time he weeds the banker's garden, mows the lawn, milks the cow and carries in water from the well in the back yard. For the faithful performance of these and other odd jobs, the banker rewards him with three silver dollars at the end of every 31-day month. Proportionate deductions are made for the months with only 30 days. In February the approximately 10 per cent deduction puts a severe crimp or dent in the family budget.

"At the end of ten years our hero is earning the truly munificent salary of $20 per month and by dint of honesty, integrity and frugality, plus Mr. Algers remarkable arithmetic, has saved $1250. Thus when the detestable and filthy tobacco chewing Squire comes to the widow's cot to foreclose the mortgage, Tim is in position to hand him the bag of silver dollars and scornfully tell him to be off and never, never dare to darken the door again."

"Better cut that down a bit," Bill interrupted. "A bag containing 1250 silver dollars would weigh about 80

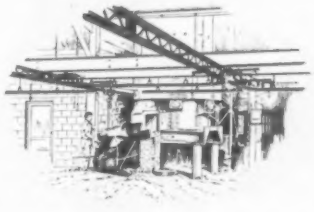
(*Concluded on page* 162)

ESSENTIAL EQUIPMENT *Now*

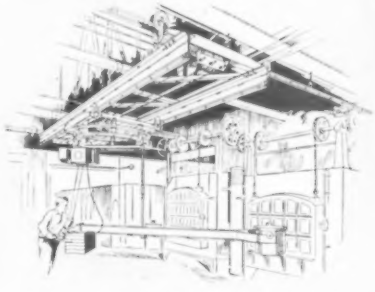
that is your solution to post-war conversion

First we must win this war. American Mono-Rail Overhead Handling Equipment is doing its part in increasing war production. American MonoRail equipment is extremely flexible. Standard parts fit quickly and easily into complete systems, offering a wide range of application without costly adjustment or lengthy engineering.

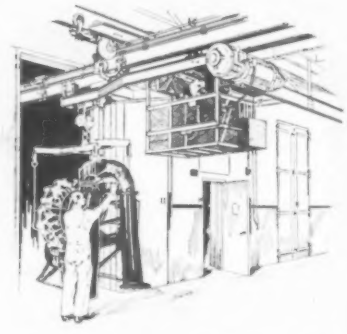
Let our engineers show you how to speed up your war production NOW and at the same time prepare for post-war conversion.



Special Crane for fast quench



Overhead Loop for Quick Pouring



Spotting Motor in Test Cell

THE AMERICAN MONORAIL CO.

13104 ATHENS AVENUE ★ CLEVELAND, OHIO

(*Concluded from page 160*)
pounds."

"Objection over ruled. Mr. Alger never made a mistake. If he said that the Squire staggered away with the 80-pound bag, why, the Squire staggered away with the 80-pound bag. Perhaps the dollars were lighter in those days. Perhaps they had become shrunken and withered from lying around so long. Surely you remember the condition of the silver dollar in 1896 when the Boy Orator of the Platte was on the rampage. In a carefully prepared, passionate and impromptu speech which earned him the nomination to the presidency, he electrified his audience by the statement that the nefarious opposition fully was determined to press down the crown of thorns and kee-ruce-a-fy LABOR on a cross of gold! Nothing like that could happen if the people adopted his silver cross—"

"Maybe not," said Bill, "but some one did a bit of hocus pocus with the double cross and that knocked the wheels from under the old chariot in which Mr. Bryan apparently was rolling to victory. The double cross, I hardly need to point out to any person within hearing of my voice, is a great institution."

"To the best of my knowledge," I said, "I am the only person within sound of your raucous voice. As a more or less free and independent citizen with a reasonably clear conscience I resent the tone of the aforesaid voice. Even to a greater extent, if that is possible I resent the weasely, side long glance and the implication that under any conceivable circumstance, I would stoop to the nefarious practice of double crossing a pal. Furthermore—"

"Furthermore," Bill placidly interrupted, "I've got you out on the end of a limb where you should be hanging on by teeth and claws instead of showing them to me. I started to tell you about a modern Horiatio Alger hero I met at the convention in St. Louis. Instead of listening with bated breath and properly respectful attention, you spring the double cross by introducing leech like babies who probably never existed, and then went into your song and dance about other equally mythical creatures who existed only in the fertile imagination of a bird who probably never was hungry, never suffered cold and privation, and who probably never did a tap of useful work in his life."

"Your handsome apology," I said, "is accepted with the usual mental reservations, and will be duly entered on the record. With all the under brush and red tape cleared away, you now have a clear field in which to spin the warp and woof of some strange tale picked up in St. Louis. You have our ear, my good man. In other words, and in the best foundry vernacular, the floors are up, the furnace is burning brightly and you can put on the wind."

"Less of the my good man stuff. It is reminiscent of other times and other places where and when one class or group of people, feels superior to another. The late Mr. Burns stuck a vent wire in that bag of wind when he declared 'The rank is but the guinea stamp. A man's a man for a' that.'

"For the past 10 years or more we have heard a great deal of the decadence and softening of American youth. They were coddled and pampered through grade school, high school and college. One third of their life was gone before they realized that this is a hard, cruel world where every man must fight his own battles and stand on his own feet. Horatio Alger's boys got an inkling of this before they shed their first teeth, or had them knocked out. By the time they were 20 years old they were seasoned warriors, mentally and physically, fully equipped to play a man's part on the stage of life.

"The story I heard in St. Louis shows that the boys of today, when put to the test, can take care of themselves. They do not wait for opportunities, they make them. Do you know Joe Garske?"

"Certainly I know Joe, a fine upstanding lad, sole owner of the Progress Pattern & Foundry Co., in St. Paul, Minn., employing about 100 men."

"Do you know how Joe became the sole owner and so forth?"

"Well, no," I admitted. "I assumed in a general way that his father left it to him or something like that."

"No one left it to him. He built it up himself from nothing in the past 9 or 10 years. He was brought up in an orphan home and at the age of 9 when other boys are becoming fairly proficient in lacing their own shoes and buttoning their own clothes, he was transferred to a farm where he remained until he was sixteen. He had no great objection to the gruelling hard work and the long hours, but he had the instincts of a mechanic and saw nothing romantic or attractive in becoming a farmer in the dell. One fine morning he hopped a freight train and eventually landed in St. Paul with his life savings, $4 in his pocket. He got a job as an apprentice patternmaker. One of the compensating features in this position was that he did not have to worry about paying any income tax. Your Spartan babies sticking to the wall for a minute or two were only pikers. Joe stuck to that job for 4 years, supported himself, gained 6 inches in height and 50 pounds in weight and like Longfellow's Village Blacksmith could look the whole world in the face and if necessary could tell any doubting Thomas to take a long running jump into the Mississippi river.

"He worked as a journeyman patternmaker at another plant for 8 years and had acquired a car and a wife when the depression of the early 30's left him up Salt Creek without a job or a pay check. In 1934 he started to make a few patterns in one half of a double garage. Shortly afterward he built a small shop and year by year added to it. Today with further expansion in view he has as tidy a patternshop and nonferrous foundry as you will find in the Twin Cities of St. Paul and Minneapolis, and what perhaps is still more remarkable there is no mortgage hanging over it. He still works 24 hours a day with occasional over time.

"You know, I think a good title for the story would be Buck Alger Rides Again!"

A tense moment where our hero (Right Center) with tongue slightly exposed, foils the Squire in his dastardly attempt

FERRO-BORON as an alloying material has gone into war production faster and to better purpose than could have been foreseen. The urgency of need has brought this about.

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A simple, economical, and highly satisfactory form in which to employ Boron for such use is a special Ferro-Boron developed by the Molybdenum Corporation. Compositions and procedures have been minutely checked and clearly defined.

Literature is available. On any application of Boron, Molybdenum, or Tungsten, correspondence is invited.

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A.F.A. WAR CONGRESS SEES

Manpower Most Pressing Problem

(*Continued from page* 125)

ment in ordnance quality and the design revisions dictated by changing tactics of war; scarcity of certain raw materials, shortage of labor; packaging problems incident to overseas shipment of equipment and supplies; and overall efficiency in Ordnance operations.

The speaker praised the aggressiveness of the steel casting industry in selling itself to the Ordnance Department and for its development work in steel casting applications to ordnance items. Reinstatement of the bessemer process in federal specifications for steel castings is likely, according to Colonel Davis, since the Ordnance Department expects to recommend this move. At the same time, disagreement over impact resistance at low temperatures probably will force the department into a specification requiring a minimum of 10 foot-pounds impact resistance at —50 degrees Fahr.

While malleable iron has been substituted in numerous instances for rolled and forged steel and nonferrous materials, Colonel Davis stated that considerable "experience and knowledge in this industry has not been organized into efficient utilization in the war effort." Improper anneal frequently has resulted in unsatisfactory malleable castings, he asserted.

Use Gray Iron Castings

The Ordnance Department's interest in gray iron castings is not confined to machine parts, dies and other equipment needs of the home front, Colonel Davis said, pointing out that some gears and bearing parts for mobile antiaircraft guns are being made today of gray iron castings. Ordnance requirements of nonferrous castings continue large as usual, the principal problem being one of material shortages beyond the control of either the Ordnance Department or the industry. (Full text of Colonel Davis' address starts on page 129 of this issue.)

Annual business meeting of the association, held Thursday morning with President Duncan P. Forbes presiding, included the officers' reports, election of officers and presentation of awards, in addition to the first A.F.A. Foundation Lecture.

An all-time high membership of 5700 in the association was announced by C. E. Westover, executive vice president and treasurer, who stated that a detailed report covering his office would be issued in July at the conclusion of the association's fiscal year.

Robert E. Kennedy, secretary of A.F.A., cast a unanimous ballot for the following who had been duly nominated to serve as officers for the coming year: President, Lee C. Wilson, Reading Steel Casting division, American Chain & Cable Co., Reading, Pa.; vice president, Ralph J. Teetor, Cadillac Malleable Iron Co., Cadillac, Mich. New directors elected for three years include: Max Kuniansky, Lynchburg Foundry Co., Lynchburg, Va.; Roy M. Jacobs, Standard Brass Works, Milwaukee; Harry Reitinger, United States Pipe & Foundry Co., Burlington, N. J.; William B. Wallis, Pittsburgh Lectromelt Furnace Co., Pittsburgh; and Duncan P. Forbes, Gunite Foundries Corp., Rockford, Ill. (Biographical sketches of the new officers and directors appear on page 198 of this issue.)

Appoint Nominating Committee

Members named to serve on the 1944 nominating committee, as announced by Chester V. Nass of the pre-nominating committee, are as follows: L. C. Farquhar, American Steel Foundries, East St. Louis; James H. Lansing, Malleable Founders' Society, Cleveland; William Romanoff, H. Kramer & Co., Chicago; and Fred G. Sefing, International Nickel Co., New York.

Alternate members named to the nominating committee are: C. P. Wright, American Brake Shoe Co., Chicago; L. E. Roby, Peoria Malleable Casting Co., Peoria, Ill.; A. E. Jacobson, Grand Haven Brass Foundry, Grand Haven, Mich.; William A. Hambley, Allis-Chalmers Mfg. Co., Milwaukee. The 1944 nominating committee also will include the most recent three past presidents: Lester N. Shannon, Herbert S. Simpson and Duncan P. Forbes.

Members of the pre-nominating committee, in addition to Mr. Nass, were Harry W. Dietert, H. W. Dietert Co., Detroit, and Horace A. Deane, American Brake Shoe Co., New York.

Winners of the essay contest prizes offered by the association to students of engineering schools were announced by Fred G. Sefing. Harry Dahlberg, University of Minnesota, was presented $100 for the paper adjudged the best among the 14 submitted, and Gerald Golden, Illinois Institute of Technology, received $50 as second prize winner.

Report on the A.F.A. apprentice contest was given by Norman F. Hindle, assistant secretary of the association. Names of winners appear on page 152 of this issue.

Annual A.F.A. awards for meritorious service to the foundry industry were presented to three men. Stanley W. Brinson, master molder, Norfolk Navy Yard, Portsmouth, Va., received an honorary life membership in the association, the award being made by Herbert S. Simpson, National Engineering Co., Chicago. Carl F. Joseph, research metallurgist, Saginaw Malleable Iron Division, General Motors Corp., Saginaw, Mich., was presented the William H. McFadden Gold Medal by Lester N. Shannon, Stockham Pipe Fittings Co., Birmingham. Rufus F. Harrington, foundry superintendent, Hunt-Spiller Mfg. Co., Boston, received the John A. Penton Gold Medal, the presentation being made by Henry S. Washburn, Plainville Casting Co., Plainville, Conn.

Foundation Lecture of the American Foundrymen's Association, presented by John W. Bolton, Lunkenheimer Co., Cincinnati, was established by the board of awards last November. Its purpose is to bring authoritative presentations of various problems of the castings industry before the association membership. Mr. Bolton, invited by the board to give the first lecture, is the author of many technical papers on the subject of metallurgy—a field in which he has long been active. He was awarded the John A. Penton Gold Medal in 1937.

Discusses Foundry Metallurgy

Mr. Bolton's lecture, entitled "Foundry Metallurgy in the Castings Industry," included a concise yet comprehensive review of metallurgical developments during the past 20 to 25 years in gray iron, steel, malleable and nonferrous foundry practice. Brief expositions were given of some unpublished research, and problems which merit further study were cited together with suggestions as to how the A.F.A. might promote further progress in foundry metallurgy. The speaker expressed the opinion that the majority of foundries have paid more attention to advanced mechanization of foundry operations than to possibilities within the extension and application of metallurgical science. "Too frequently it is not realized that foundry metallurgy also has economic significance, and is in the long run a sound basis or starting point from which to build up a truly integrated foundry business and a strong industry," he asserted. Mr. Bolton's paper will be published in full in coming issues of THE FOUNDRY.

A special war problems session dealing with training women for industry was held Wednesday evening and drew a large attendance. Chairman of the meeting was W. J. Hebard, director of personnel, Continental Roll & Steel Foundry Co., East Chicago, Ind., and the speaker was Sara Southall, supervisor

American Foundry Equipment Co. Receives Army-Navy "E"

"For great achievement in the production of war material," American Foundry Equipment Co., Mishawaka, Ind., received the Army-Navy "E" award on April 16. After greetings to employes and guests by Verne E. Minich, founder of the company and chairman of the board, the "E" pennant was presented by Brig. Gen. Trelawney Marchant, Fifth Service Command Headquarters, representing the Army. As representative of the Navy, Comm. H. O. Lord, U.S.N.R., assistant superintending civil engineer, Bureau of Yards and Docks, Area 5, presented lapel pins to workers. Otto A. Pfaff, president, accepted the pennant in behalf of the company, and J. Robert Bunch, president, Local No. 995, UAW-CIO, represented the employes in receiving the "E" lapel pin. Above, left to right, are Mr. Pfaff, Commander Lord, Mr. Bunch and General Marchant. Speakers' platform shown at right

of employment, International Harvester Co., Chicago.

It is Miss Southall's belief that women will of necessity have to be utilized by industry within 3 to 6 months in numbers not contemplated by industrialists at this time. The training of women for work in foundries, particularly those engaged in jobbing work, is really more difficult than might be expected.

In a survey prepared recently and presented before the Wisconsin Chapter of the A.F.A., the following jobs were listed as being held by women in four Midwestern states: Core room, including coremaking, pasting, blacking; cleaning room, including cutters, grinders, chippers; welding; molding department, including molding, molders on squeezer machines, molders' helpers; melting room, including weighing alloy charges, taking metal temperatures, pouring and transporting molten metal; general laboratory work; and sand handling, including testing and operating sand mullers. One foundry reported a woman converter operator.

Miss Southall emphasized the need for observing safety precautions. Some companies have permitted women to work in the foundry in open toe shoes or with bedroom slippers. Women, the same as men, must be protected with safety shoes.

The government has developed the following policy which it asks industrialists to follow in sections where womanpower is needed to meet production demands. First, hire single women, then married women without children, next married women with children over 14 years of age, and finally married women with children under 14. Regarding day nurseries for children, Miss Southall suggested that companies take an active interest in the project from the community standpoint rather than establish and try to operate such nurseries themselves.

Most companies have adopted the policy with regard to wages of equal pay for equal work. Training programs follow no set rule, but the speaker stated that the programs established by the Training Within Industry Division of the War Manpower Commission are a great help in simplifying jobs and shortening the training period. Women with training in the job instructor training courses are better supervisors than the

(*Continued on page* 168)

Information supplied by an Industrial Publication

Efficient utilization of recoverable alloys in foundry scrap, which is of vital importance today in foundries making alloy castings, depends primarily on thorough scrap segregation.

The principal factors to be considered in segregation are: positive identification of scrap, adequate storage facilities and constant supervision.

Several methods of sure identification are available. For example, riser shapes can be varied according to composition. Core wires can be inserted in sprues. Molds can be marked to indicate special handling of sprues, gates and risers. Paint of different colors applied after shaking out is a simple, effective method.

Adequate storage space implies first, sufficient room to keep scrap segregated in storage. The amount of space provided should also take into account the ultimate disposition of the scrap. That is, will it be used by the foundry storing it, or be allowed to accumulate before shipment elsewhere?

Proper and continuous supervision is essential to thorough segregation. In fact, it is doubtful if any segregation program will be completely effective unless someone equipped with adequate authority is made directly responsible for maintaining it.

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Pangborn Corp. Awarded Army-Navy "E" for War Production

Before an audience of more than 5000 persons, including 1200 employes, the Pangborn Corp., Hagerstown, Md., was awarded the Army-Navy "E" in a colorful ceremony held at Pangborn Park, April 20. Senator Millard E. Tydings of Maryland acted as chairman. An address by Governor Herbert R. O'Conor of Maryland was followed by presentation of the "E" burgee by Lieut Col. D. A. Starry, Army Air Forces, Washington, to Thomas W. Pangborn, president of the company. Howard W. Easton, oldest employe of the company in point of service, accepted the "E" pin for the employes from Comm. H. G. Chandler, U.S.N.R., Washington. Above is Mr. Pangborn delivering his speech of acceptance of the award

(*Continued from page* 166)

old time supervisor type. With proper training and background, women can be used as supervisors. At International Harvester, outstanding girls were chosen from various departments and plants and were given 13 weeks training to prepare them for setting up facilities in plants prior to the hiring of women at those plants. The company now is developing a 6-month training course for foremen, open to both men and women. This previously was a four-year course.

Two unsatisfactory attitudes are apparent among some organizations employing women. Some offer the job to women on the same basis it formerly was filled by men. The other is a coddling attitude which is equally bad. Instead of these, the speaker suggested the attitude of fair treatment, understanding and the expectation of a good day's work. Miss Southall stressed the importance of preparing facilities for women employes so that these will be ready by the time women are needed. Unless this is done, production will be delayed because of lack of facilities for women workers. Regarding postwar possibilities, Miss Southall believes that women are entering industry as a patriotic duty to help win the war, and as soon as the war is over, they will want to stop working in the heavy industries.

The speaker stated that in introducing a woman to her work at International Harvester plants, the woman supervisor sees that she is equipped with such safety equipment as is needed, and then she is introduced to the foreman and turned over to a teacher for instruction.

During the discussion which followed the address, Mr. Hebard took an informal poll on the problems facing the industry. Regarding the relative importance of shortages, materials or manpower, the consensus was manpower by an overwhelming majority. The majority of those present reported absenteeism of 5 to 10 per cent with some under 5 per cent and none over 10 per cent.

Comment on methods used to solve manpower problems revealed that the Hunt-Spiller Corp. in Boston has been successful through the use of high school boys working from 3:30 to 7 p.m. This arrangement was worked out through cooperation with the Boston board of education. The boys knock out cores, sort castings, etc., but they must be kept away from fast moving machinery. A Cleveland foundry reported a similar plan in use at its plant with boys working from 4 until 7 p.m., doing general labor work, finishing and chipping castings as well as some core knockout work.

Apprentice training problems under war conditions were given serious con-

(*Continued on page* 170)

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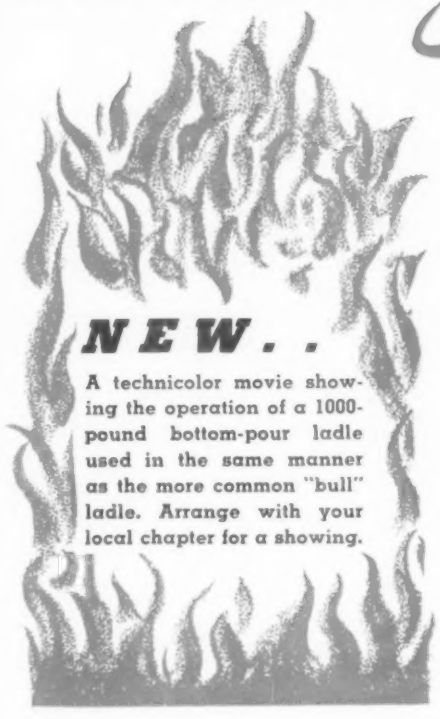
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Whiting Corp. Presented Army-Navy "E" Production Award

The Army-Navy "E" Production award was conferred on the Whiting Corp., Harvey, Ill., April 20. Ceremonies took place in a new section of the plant. Presentation of the "E" burgee and lapel pins was made by Col. John Slezak, deputy chief of the Chicago Ordnance District, and Lieut. Comm. William L. Nunn, district industrial relations officer, Ninth Naval District, Chicago. The flag was accepted by Howard D. Grant, company president. Above, left to right, are: Mr. Grant; Brig. Gen. Thomas S. Hammond, chief of the Chicago Ordnance District and former president of Whiting; S. H. Hammond, executive vice president; Colonel Slezak and Commander Nunn

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(*Continued from page* 168)

sideration at the apprentice training session on Friday morning. Clement J. Freund, dean of engineering, University of Detroit, was chairman of the meeting. Richard Falk, Falk Corp., Milwaukee, in speaking on, "Maintenance of Apprenticeship in the Face of the Selective Service Act," stated that if apprenticeship survives the war period, it will emerge in materially revised form. He reported that at a 2-day conference in New York recently, the following suggestions were evolved after comparing difficulties with representatives of companies through the United States. Eliminate the probationary period, provide unlimited overtime, ease credit restrictions for previous apprenticeship training, and visual training and technical training outside the shop to speed up training. To fill the ranks, the selective service trend was followed downward until the high-school-age boys were reached. Some companies have worked out a co-operative training program with these high schools whereby the boys work 2 weeks and attend school 2 weeks. Older men have been introduced to the apprenticeship group and to interest them, higher rates than ordinarily allowed have been provided by paying on a piece-work basis and by providing overtime and advancement to more productive jobs as soon as the men are ready. Men in the 4-F classification also are being brought in as apprentices.

Mr. Falk made several suggestions for keeping up interest in apprenticeship. When an apprentice must leave for the armed forces, supply letters of recommendation which detail his training and experience; present him with a certificate showing the amount of time he has served on his apprenticeship so that he will feel he has partly reached an ultimate goal; and finally, while he is serving in the armed forces, write him letters.

L. J. Fletcher, director of training, Caterpillar Tractor Co., Peoria, Ill., stated that when the draft age limit dropped to 18 years, the company made arrangements with the board of education to take boys 16 years of age out of high school and give them the Caterpillar apprentice course. When the 4-year course is completed, the boys not only receive their apprenticeship certificate, but also their high school diploma. If they leave for the armed forces before completing the apprenticeship, they are given credit for the work already finished

(*Continued on page* 172)

SOME ROSS CORE AND HEAT TREAT OVEN INSTALLATIONS

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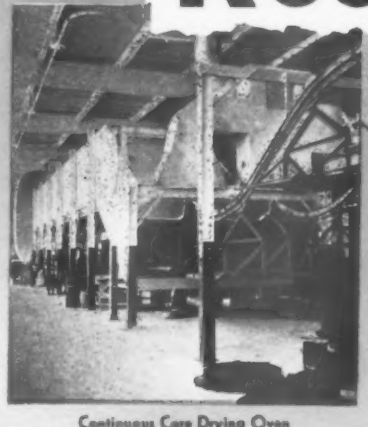

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To magnesium and aluminum foundries and to those that plan to convert, the factors of core baking uniformity, speed, accuracy, control and costs have become of paramount importance. Older baking methods and apparatus must give way to ovens designed especially for lighter metals, such as the complete line of sizes and types of Ross Core Ovens built to provide all five of the necessary operating features and advantages.

Ross Continuous Core Baking Oven

1 **UNIFORM TEMPERATURES:** Large quantities of circulated air insures uniform distribution of heat at low temperature differences.

2 **AIR DISTRIBUTION:** Use of special nozzles increases air flow and turbulence, prevents stratification and insures uniformity throughout full oven.

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CONTROL OF AIR FOR MODERN INDUSTRY

(*Continued from page* 170)

and will have a shorter training period to complete at the end of the war.

Second speaker at the meeting was W. J. Hebard, Continental Roll & Steel Foundry Co., East Chicago, Ind., who discussed "Getting Results from Accelerated Training." Mr. Hebard emphasized the necessity of a well planned training program, and suggested that foremen and department heads develop a plan to meet definite objectives. Instructors need not be men who are most skilled in a certain line of work, but they should be men who have knowledge of the job, know and understand people and have the knack of being able to transfer their knowledge and correct work habits to the learner. Training programs that are planned thoroughly will work well. Mr. Hebard cited the instance in the Continental plant where women are trained as crane operators to work alone after a 7-day training program. He stated that the job relations training program presented by the Training Within Industry Division is of great value, but it is necessary for management to follow through continually to gain maximum benefits.

W. W. Rose, executive vice president, Gray Iron Founders' Society, was the principal speaker at the annual dinner Wednesday evening of foundry instructors in engineering schools. Fred G. Sefing, International Nickel Co., New York, presided. Mr. Rose offered several suggestions for correcting the lack of understanding of the importance of the foundry industry and its products and for increasing the industry's desirability as a career to young engineers.

Actually, the industry has four classes of people to educate, he stated. "First there are the foundrymen themselves who must be made aware of the necessity for making their plants a more desirable place to work in, (good housekeeping), of the value of introducing technically educated men into their plants for both operation and sales, of offering adequate inducement to attract such men, and finally of the value of publicity.

"Second there is the job of showing embryo engineers the prospects a foundry career holds out to them and then giving them a sound fundamental education in the art so that they may make good and disappoint neither their employer nor themselves.

"The third job is to give the engineering classes in schools and societies a better knowledge of what gray iron is, how it can serve them and its limitations. These men are the consumers of tomorrow.

"The fourth class is the general public. The government, of course, is all-controlling today, but even with the coming of peace it is doubtful if their long arm will be shortened for years to come and we must make them as much aware of our importance as they are of plastics, steel, electronics, etc."

Mr. Sefing stressed the importance of the foundry industry impressing technical schools with the fact there is a demand for greater instruction in foundry practice. He cited the case of one institution which was prevailed upon to offer an additional course of foundry lectures in the evening. Enrollment in the series was far above the school's expectations.

Delegates from the various chapters of the A.F.A. Wednesday afternoon, and under the chairmanship of Lee Wilson, discussed many problems arising out of chapter work. A considerable portion of the time was devoted to consideration of the types of programs which seem to attract the greatest attention from members and serve best the needs of the chapters. An informal dinner of chapter delegates followed the meeting.

The dinner which marked the closing of 47th annual convention of the American Foundrymen's Association packed the ball room of Hotel Jefferson to capacity. The event was marked by two outstanding addresses, one by Lt. Col. Joseph M. Colby, Ordnance Department, U.S.A., and the other by Hon. Dwight P. Griswold, Governor of Nebraska. Lt. Col. Colby, recently returned from North Africa, presented personal observations on how American tanks and men stand up under grueling desert warfare. Governor Griswold under the title *"Industry Fights a War,"* presented an optimistic picture of the postwar period.

BRASS AND BRONZE
Sessions Feature Reports

THREE papers dealing with brass and bronze founding were presented at a session Thursday afternoon under the joint chairmanship of Wm. Romanoff, H. Kramer & Co., Chicago, and W. W. Edens, Ampco Metals Inc., Milwaukee. The first was a committee report on "Tentatively Recommended Practices for the Casting of Manganese Bronze (High Strength Yellow Brass and High Strength Leaded Yellow Brass in Sand Molds)." The second paper dealt with the effect of lead on some of the mechanical properties of manganese bronze and was presented by G. P. Halliwell, H. Kramer & Co., Chicago. The third paper, also on the subject of lead in manganese bronze, was presented by A. H. Hesse, Naval Research Laboratory, Anacostia Station, Washington.

The committee report submitted by B. A. Miller, Cramp Brass & Iron Foundries Division, Baldwin Locomotive Works, Philadelphia, is the second revision of one of a series of recommended practices for copper base alloys sponsored by the brass and bronze division of the American Foundrymen's Association. While the practices given are recommended by specialists in the various fields, they are not intended to be used as specifications. Wherever possible, the alloys given in the tables are identified with existing alloy specifications and are limited to sand cast manganese bronzes. Under the head of general recommendations, the report covered sand, facing, gating and risering, cores, types of melting equipment, precautions, coverings, melting and pouring range, finishing, heat treatment, chemical control limits, typical properties of sand castings, conforming specifications, analysis of defects.

It was pointed out that manganese bronze is characterized by high shrinkage and a tendency to form dross when the liquid metal is agitated. Castings should be designed with as uniform a cross section as possible. Where this is impracticable, generous fillets should be provided at junctions of sections. Radius of the fillet should be equal to at least ½ the metal thickness of the wall of the casting to which it is attached. Properly set chills often eliminate the need for excessive risering. Drossing tendency of this alloy makes necessary special precautions in gating to prevent dross inclusions in the casting. The mold should be filled by simple displacement as in bottom pouring or by any other method whereby the velocity of the stream from the gate is reduced to a minimum. Choke gates, strainer cores and pouring basins should allow the metal to enter the mold without turbulence.

Recommends Top Pouring

At a Friday session presided over by G. K. Dreher, Ampco Metals Inc., Milwaukee, J. E. Crown, Naval Gun Factory, Washington, presented a report of the Brass and Bronze Division of the American Foundrymen's Association on "Tentative Recommended Practices for Sand Cast Copper-Silicon Alloys." Molding sand for these castings conforms to the following specifications: Grain size 140 to 200, clay content 10 to 20 per cent, permeability 15 to 39, green compression strength 7 to 9 pounds per square inch, moisture content 5 to 6 per cent. In the majority of instances facings are not needed.

Copper-silicon alloys shrink more than gun metal, but not to as great an extent as manganese bronze. As a general rule gates and risers suitable for gun metal may be applied to the silicon bronzes. Slightly larger fillets should be added as a safety measure against internal shrinkage cracks. Chills may be used in some cases. Bottom pouring is not recommended for heavy work. Top pouring through risers, feeding basins and pencil gates or sprues will produce sound, clean castings.

As with any other type of metal and casting the riser should be of sufficiently large cross section so that the metal in the riser is the last to freeze. Height of the riser may be roughly determined as twice the diameter of the cylindrical riser base. The system of blind risering and atmospheric pressure introduced

(*Continued on page* 174)

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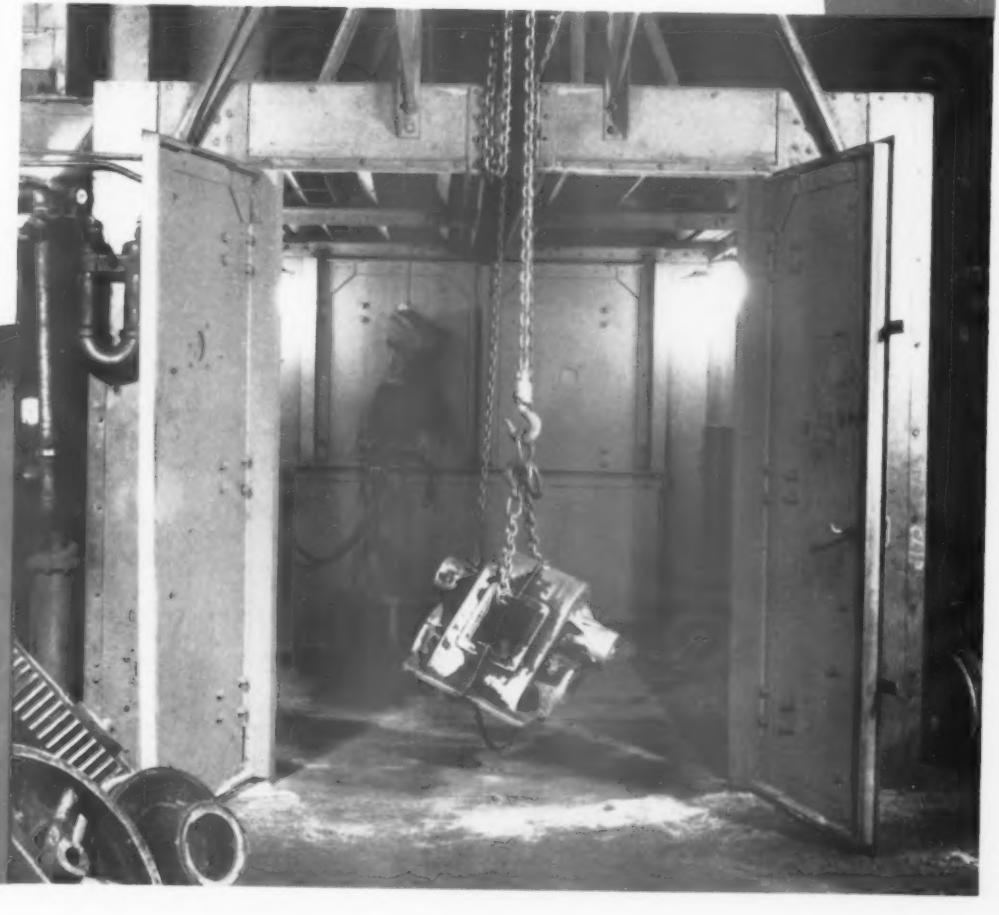

Sly Blast Room, 8' x 12', with double swing doors at both ends. Ceiling of blast room arranged for monorail.

The exhaust from this room is handled by 7 ft. section of 11' Type 360 Sly Dust Filter.

(*Continued from page* 172)

recently in steel foundry practice may be applied to silicon bronze castings. Attention was directed to the fact that if the moisture in the sand is excessive, a reddish, brick like dust from 1/16 to 1/8-inch in thickness will cover all outside surfaces of the casting.

A similar committee report on "Tentative Recommended Practices for Aluminum Bronze" was presented by W. W. Edens, Ampco Metals Inc., Milwaukee.

Harold B. Zuehlke, Production Supervisor of Maritime Contracts, Allis-Chalmers Mfg. Co., Milwaukee, prefaced his paper on "The Hows and Whys of Centrifugal Castings" by the statement that there are two general types of centrifugal castings, namely one which uses a center core and a second which uses no core. In the latter the centrifugal force of the rapidly revolving mold holds the metal against the walls of the mold. This paper was confined to the second type. Through illustrations Mr. Zuehlke showed the various parts of the casting machine other than the driving mechanism. He described how the speed of the mold and the vertical taper of the outside walls are calculated, also showed curves which can be used to ascertain rapidly revolving mold speeds. Other items included tilting the mold, how the metal is distributed, methods of calculating speeds and tapers of molds poured in a tilted position, basic engineering formulas, mold materials, wall protection and wall draft. Related subjects included measuring the quantity of metal to be poured, condition of the metal at the time of pouring, and special procedures for handling large castings. The paper concluded with a discussion of the advantages of centrifugal casting, structures obtained in the castings and the relative cost as compared with sand casting.

An overflow attendance marked the brass and bronze division round-table luncheon Friday noon. It was presided over by B. A. Miller, Cramp Brass & Iron Foundries division, Baldwin Locomotive Works, Philadelphia. Immediately following, D. Frank O'Connor, Walworth Co., Greensburg, Pa., presented a paper on "Recommended Practice for Temperature Control."

SYMPOSIUM ON MELTING
Of Malleable Iron

OPENING session for malleable foundrymen was a roundtable luncheon and discussion held Wednesday noon with A. M. Fulton, Northern Malleable Iron Co., St. Paul presiding and R. J. Teetor, Cadillac Malleable Iron Co., Cadillac, Mich., as co-chairman. The meeting was well attended, and following the luncheon Mr. Fulton called on K. H. Hamblin, Grinell Co., Providence, R. I., who spoke briefly on some of his experiences while a member of the Forgings and Castings Section, Steel Division, WPB, Washington. Following his remarks the meeting was thrown open to a general discussion of problems in producing malleable iron castings.

Activities of the malleable division centered chiefly in a three-section symposium on melting practices. The subject was introduced at the first section by Dr. Harry A. Schwartz, manager of research, National Malleable & Steel Castings Co., Cleveland, who reviewed the more important considerations involved in melting. This contribution discussed the principles which limit the temperature obtainable in a furnace, specifically, those underlying the transfer of heat to the molten metal and effect of furnace gas compositions on the melt. Duncan P. Forbes, president, Gunite Foundries Corp., Rockford, Ill., presided over proceedings in this session. Carl F. Joseph, metallurgist, Saginaw Malleable Iron Division, General Motors Corp., Saginaw, Mich., was co-chairman.

Fundamentals involved in the burning of powdered coal and of combustion in malleable melting furnaces were considered in a paper by J. A. Durr, Albion Malleable Iron Co., Albion, Mich. The author stressed the need for standardizing melting practice to meet present-day specifications and recommended frequent checks to insure uniform practice. He gave a suggested order for such standardization.

Melting in the air furnace with oil as fuel was discussed enthusiastically by A. Van Lantschoot, superintendent, Iowa Malleable Iron Co., Fairfield, Iowa. He pointed out that a considerable number of plants have practiced oil melting with varying degrees of success, each in the absence of reliable information, attempting to solve its problems in its own way. In the author's experience, change from hand coal firing to oil seemed simple, but difficulties in maintaining correct furnace atmosphere proved hard to overcome, especially when handicapped with the disadvantage of high stacks.

Attractive fuel rates frequently were accompanied by excessive oxidation, Mr. Van Lantschoot asserted. On the other hand, high fuel rates often would be followed by unruly schedules. Nevertheless, he regards oil an excellent fuel. Disadvantage of high fuel cost is compensated for by numerous advantages, its use permits simplified handling and storage, and, with proper application of suitable air and fuel ratios and partial elimination of the human element through use of a flow meter, uniform results are obtained consistently.

General discussion at this session was centered largely in more or less highly technical aspects of combustion, the nature of the gases, effect of gases on oxidation, and the angle of impingement of the flame on the bath to provide proper circulation of the metal.

Second section of the malleable foundry melting symposium was held at 4 o'clock Thursday. Dr. Harry A. Schwartz, National Malleable & Steel Castings Co., Cleveland, and George Harris, Belle City Iron Co., Racine, Wis., presided. The meeting was opened with a paper by Leo J. Kelly, Fort Pitt Malleable Iron Co., Pittsburgh, on "Open-hearth Furnace for Production of Malleable Castings". He pointed out that the furnaces which are oil-fired have advantages and disadvantages. Advantages include ability to permit close control of chemical composition of the charge during melting and refining, and production of large tonnages daily over long periods of time before major repairs are necessary. Disadvantages are that the furnaces must be kept hot over week ends and during temporary shut-downs, and that only two tapping spouts can be used, requiring a longer time for pouring off.

F. J. Wurscher, Acme Steel & Malleable Iron Co., Buffalo, described duplexing of malleable iron with the cupola and air furnace. The cupola lined to 48 inches melts from 10 to 12 tons per hour. Metal charges are composed of 10 percent malleable pig; 5 per cent silvery pig; 4 per cent malleable scrap; 30 per cent steel scrap, and 51 per cent white iron scrap. Deficiency in manganese is compensated by ferromanganese or spiegeleisen. Coke to iron ratio is 1 to 10, and the air is controlled by a weighing device.

Melt at High Temperature

In response to a question on temperature Mr. Wurscher said that metal from the cupola was at a temperature of 2830 degrees Fahr., and out of the air furnace about 2930 degrees Fahr. He said that he secured a lower pick up of carbon with coke measuring 3 x 5 inches than with larger sizes, and that no trouble was encountered with primary graphite. Another speaker said that if the carbon content from the cupola ranged from 2.60 to 2.70 per cent at the beginning of melting and for the first several hours, it would drop to 2.40 to 2.50 per cent during the latter part of the heat.

Third paper on "Cupola Electric Duplexing" was presented by Charles Morrison, Saginaw Malleable Iron Division, General Motors Corp., Saginaw, Mich. Cupolas used are lined to 73 inches at the bosh, and melt at the rate of 30 tons per hour. Metal charges consist of 22 per cent steel; 10 per cent hydraulic bundles; 10.5 per cent silvery pig; 5 per cent soft iron scrap, and 52.5 per cent sprue. Iron to coke ratio is about 11 to 1. Electric furnaces for duplexing have a capacity of 32 tons per hour with hot metal. A bath of 10

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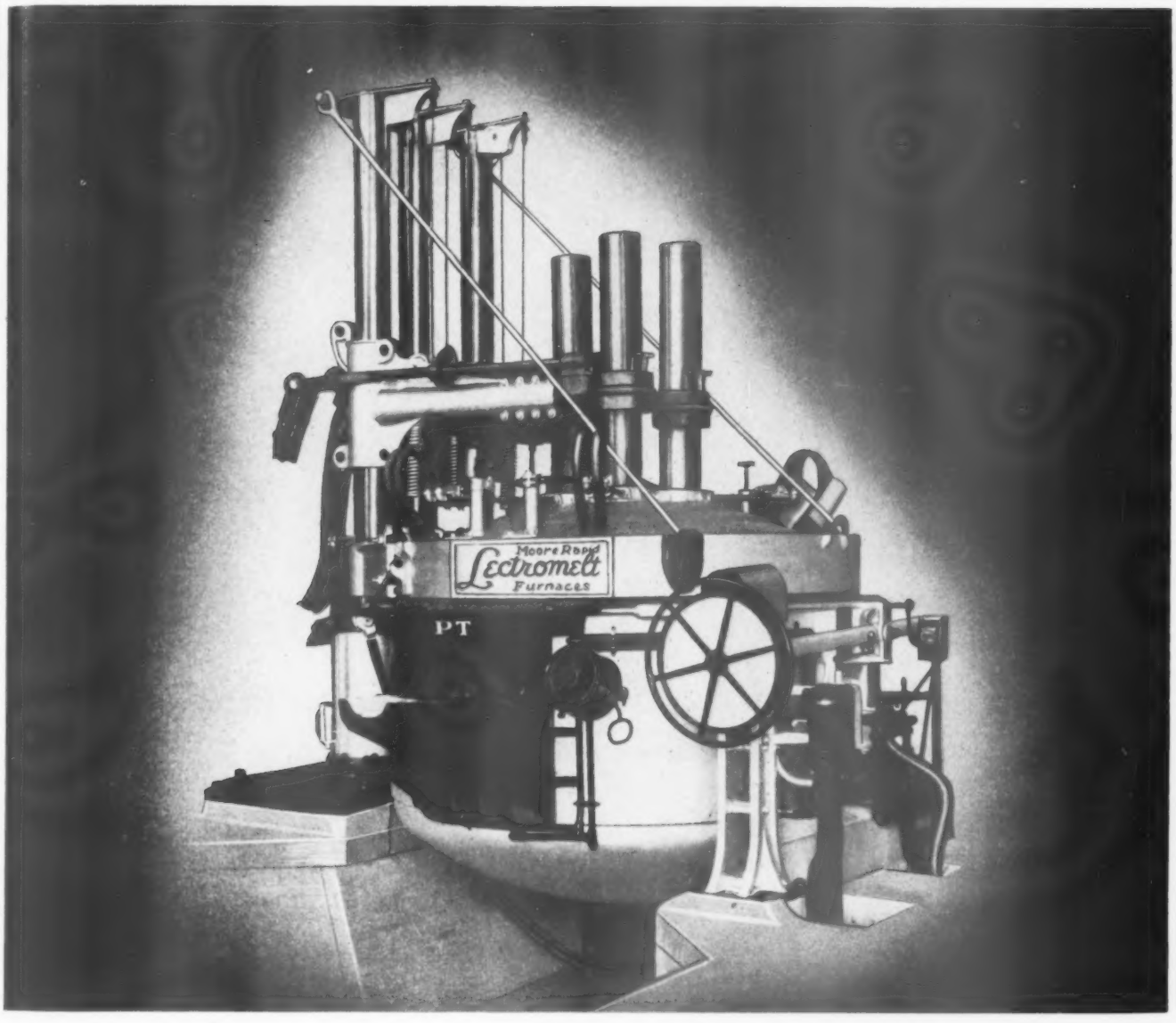

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tons is held in each of the two electric furnaces. Three tons of molten metal are added in such a manner that one furnace is superheating while the other is tapping. Hence, a continuous supply of metal is available. Superheating takes about 2 minutes.

Final paper of the session was by H. W. Maack, Crane Co., Chicago, on cupola malleable melting. The product is used for pipe fittings, and the iron to coke ratio ranges from 5 to 7.5 to 1. About 50 per cent foundry returns are used in the charge. Close attention is given to melting to insure a uniform melting rate which provides a uniform temperature at the spout of 2775 to 2850 degrees Fahr., and enables the control of the carbon content. Composition of the iron shows 2.80 to 3.10 per cent carbon; 0.70 to 1.10 per cent silicon and 0.40 to 0.60 per cent manganese. Tensile strength is 40,000 pounds per square inch minimum; yield point 30,000 pounds per square inch minimum, and elongation from 2.5 to 5 per cent.

In the discussion it was brought out that no difficulty was encountered in cupola malleable with embrittlement resulting from hot galvanizing, and that higher carbon gave better machining properties. It also was mentioned that susceptibility of regular malleable to galvanizing embrittlement might be due to an unbalance of the silicon-phosphorus ratio. Holding the silicon to 1.20 per cent or below, and maintaining the silicon-phosphorus ratio at 0.12 or below aided considerably in eliminating difficulty.

Melt in Rotary Furnace

Operation of the rotary type furnace in melting malleable iron was discussed at the third malleable foundry melting symposium Thursday evening in a paper prepared by W. Zeunik and Kenneth Mason, National Malleable & Steel Castings Co., Indianapolis, and presented by the latter. Carl F. Joseph, Saginaw Malleable Iron division, General Motors Corp., Saginaw, Mich., was chairman and Andrew M. Fulton, Northern Malleable Iron Co., St. Paul, was co-chairman of the meeting.

Furnaces described by Mr. Mason are normally of 5-ton capacity. Fuel is pulverized West Virginia soft coal of approximately 14,980 b.t.u. content and containing 20.75 per cent volatile matter. Low volatile coal has been found necessary for satisfactory performance. The furnace is fired through the opening in one end, and flue gases escape into a stack through the other end. This stack also serves to preheat air used to burn the fuel, being lined with special shaped fire clay blocks which allow passage of air down through them without contamination from flue gases. The recuperator is able to raise the temperature of the secondary air to 600 degrees Fahr., the high air temperature resulting in shorter melting time, higher metal tapping temperature, less fuel consumption.

Silica brick service lining is employed in the furnace. Linings will last from 100 to 200 heats when making malleable iron if they have had proper care through the heating up periods. It was recommended that once the unit is brought up to operating temperatures the lining be maintained at above 1000 degrees Fahr. during shutdown periods of 1 or 2 days. In making the first heat of the week, practice is to heat the lining slowly to a temperature of about 2800 degrees Fahr. before charging.

In listing advantages of the furnace, the speaker indicated that efficiency in performance hinges on a rather continuous operation, although after the first heat it is unnecessary to preheat the lining if the furnace is kept operating at least 16 hours a day. A 5-ton heat of low carbon malleable iron can be made in 2 hours or less from firing until tapping time, with average fuel consumption of 350 to 450 pounds per ton of melt. Tapping temperatures as high as 3100 degrees Fahr. can be obtained, making the furnace adaptable for a wide range of melting. When making heats of the same tonnage and analysis specifications, the furnace can be depended upon for uniform operation, both as to melting time and composition.

Recommendations for selection of malleable furnace refractories were made by C. A. Brashares, Harbison-Walker Refractories Co., Pittsburgh, in a paper on this subject. For the cupola, high heat duty fire clay brick meet most requirements, he stated, although some operators believe the trend toward higher temperatures makes use of super duty fire clay brick in the melting zone desirable.

Sand still is favored for the air furnace bottom, especially with cold charges, while high duty fire brick generally is employed for side walls. Super duty brick ordinarily is used on the latter only for sections experiencing severe service. For rotary furnaces, silica brick is preferred, longer service being reported than with a super duty fire clay brick lining. This confirmed opinion of the previous speaker.

Other applications cited by Mr. Brashares included high quality silica brick and gannister for acid electric furnace walls and bottom, respectively, with the brick laid loosely to compensate for expansion; high heat duty fire clay brick for ladles; and high heat super duty fire clay or silica brick for annealing ovens. Oven temperatures are relatively low, but muffles require protection.

In later discussion average refractory life for the air furnace on batch melting was placed at about 100 heats for the bottom and 25 for side walls.

A third paper, "Practical Points in Malleable Melting," was presented only by title in the absence of its author, James H. Lansing, Malleable Founders' Society, Cleveland.

PATTERN PRODUCTION

Problems Are Considered

THE patternmaking session, held Thursday afternoon under the chairmanship of Vaughn Reid, City Pattern Works, Detroit, with Frank C. Cech, Cleveland Trade School, Cleveland, as co-chairman, was opened by Tom Kaveny Jr., chief, foundry equipment and supplies section, War Production Board, Washington. Mr. Kaveny explained the new ruling regarding the procurement of aluminum for pattern production and indicated that there would be changes. He pointed out further that it was possible to turn in obsolete or scrap aluminum pattern equipment to be remelted for new aluminum patterns, but that is the only type of aluminum scrap that can be used for pattern production.

First paper of the meeting was presented by W. D. Walters, supervisor of time study, Feeder Division, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., whose topic was "Job Analysis and Predetermining of Time Values for Patternmaking". Mr. Walters pointed out that job evaluation of metal patterns does not offer the difficulties presented by wood patternmaking since wood patterns are not a repetitive type of work.

The company has met that difficulty by classifying patterns. When broken down into component parts, patterns have the same general characteristics, differing only in size or some details of design. The pattern is sketched free hand on a reference card and time allowances for the various operations are noted and totaled. The reference card is kept on file in order to assist in determining time allowances on future, similar pattern work. The person who analyzes the new patterns and establishes the time allowances is one who has experience as a patternmaker, and has good judgment. Sometimes, time study training and guidance is necessary. The Westinghouse pattern shop employs 125 patternmakers and two men, working 8 hours each, predetermine the time allowances on all patterns for the shop.

W. C. Anderson, Missouri Inspection Bureau, St. Louis, followed with a review of "Insurance Protection of Patterns". In introducing his topic Mr. Anderson stressed the importance of adequate fire protection as basic protection for patterns and all equipment. He then reviewed types of insurance available for coverage of patterns and discussed the responsibilities of the pattern producer, owner and user in its protection.

Considerable interest was manifested in the discussion of "Salvaging Metal

Patterns and Protective Coating for Wood Patterns," presented by C. M. Barton, Metallizing Co. of America Inc., Chicago. Mr. Barton first described the metallizing process. By the use of the process to cover wood patterns, a less expensive grade of wood may be employed. The pattern should be made smaller than working dimensions, the surface prepared by sanding, and followed by application of the metal coating to meet the required working dimensions. The metal seals the wood against moisture and its wear resistance is similar to that of a metal pattern. Mr. Barton then presented suggestions and methods for salvaging metal patterns by rebuilding worn sections.

The meeting was concluded with a report on shellac substitute pattern coatings presented by Frank C. Cech, Cleveland Trade School, Cleveland, and based on tests made at the school. All the coatings tested were found to be just as satisfactory as the shellac coating formerly employed exclusively.

ALUMINUM-MAGNESIUM
Attract Considerable Attention

RECENTLY formed Aluminum and Magnesium Division of the A.F.A. got off to a flying start with two technical sessions, a roundtable luncheon conference, and a sand shop course. All of those were extremely well attended, indicating the intense interest in light alloy castings production. The first session was held Wednesday afternoon under the direction of Chairman Dr. N. E. Woldman, Eclipse Aviation-Pioneer Instrument Division, Bendix Aviation Corp., Bendix, N. J., and Co-chairman Ben D. Claffey, Gray Iron and Aluminum Division, General Malleable Corp., Waukesha, Wis.

First paper on the program was the report on "Recommended Practices for Magnesium Foundry Alloys" which was presented by M. E. Brooks, Dow Chemical Co., Bay City, Mich., who is chairman of the committee on recommended practices. The lengthy and detailed report covered various phases involved in producing magnesium alloy castings, such as molding, melting and cleaning. According to the report the preferable molding sand is a synthetic type of 60 to 90 grain size with 3 to 4 per cent bentonite and about the same amount of water. In some instances diethylene glycol is added to replace part of the water, and as an inhibitor. Other inhibitors employed include boric acid, sulphur, and fluoride salts.

Use of a number of small gates is more advisable than a few, and large risers must be present to insure feeding. Cast iron chills often are employed to provide directional solidification. Skim gates of perforated metal are efficacious in preventing dross entering the mold cavity, and admission of sulphur dioxide gas into the cavity before pouring eliminates any possibility of burning. Cores should be open, and hard enough to handle, but not so much so that contraction of the casting is prevented. The cores must be vented well.

Magnesium alloys are melted in cast or fabricated steel pots of 1500 to 2000-pound capacity and then poured into smaller crucibles for superheating and pouring. Various fluxes are employed to remove inclusions and to prevent burning. Coating the exterior of crucibles with aluminum has been found to reduce scaling. Crucibles should be tested regularly by tapping with a hammer to determine soundness. Ingot and scrap metal to be melted should be dry, otherwise considerable difficulty will be encountered with burning and porous castings. Likewise any fluxes employed should be dry before being used. Before pouring magnesium alloys must be superheated to 1650 degrees Fahr. for 15 minutes to insure fine grain size and highest physical properties. Pouring basins on the molds are almost essential as they prevent metal from entering directly into the sprue, and thus carrying dirt and dross into the mold cavity. Since magnesium alloys are hot short, they must be permitted to cool properly before shaking out.

Second paper presented at the session was on "Temperatures Developed in Sand Cores During Casting of Magnesium Alloys," by A. T. Peters and M. V. Chamberlin, Dow Chemical Co., Midland, Mich., and was presented by Mr. Peters. The authors used cores 3 inches in diameter and 8 inches long around which they poured gray iron, bronze, aluminum and magnesium. The cores contained thermocouples located at ⅛, ¼, ½-inch below the surface and near the center so that temperatures at those points could be ascertained. It was found that the highest temperatures developed with gray iron 10 minutes after pouring at around 1760 degrees Fahr. and the lowest with magnesium at 800 degrees ⅛-inch below the surface.

Heat content of aluminum alloys is about 70 per cent more than magnesium alloys under equal pouring conditions. The temperature developed in cores by magnesium not only is appreciably lower than for aluminum, but also the time during which the temperature is retained is shorter. With the core described the temperature reached at the center with magnesium alloys was about 500 degrees Fahr. Experiments in a muffle furnace with cores in oxidizing and reducing atmosphere indicated that an exothermic reaction occurred at 650 degrees Fahr. under oxidizing conditions.

Conclusions reached were that further investigation is needed to develop binders which permit more rapid break down of cores used for magnesium alloys. Due to the low temperatures developed, little disintergration occurs, as in the case of other alloys. An ideal binder for the purpose would be one that would permit breakdown around 400 degrees Fahr.

Final paper on the program was one entitled "Chemical Analysis of Sands for Magnesium Castings" by E. W. Cramer, Washington State College, Mining Experiment Station, Pullman, Wash. In the absence of the author this was presented by R. E. Ward, Eclipse Aviation Division, Bendix Aviation Corp., Bendix, N. J. It described the procedures to be employed in determining the quantity of inhibitors such as sulphur, boric acid, diethylene glycol, and ammonium fluosilicate in the molding sand so that more accurate control is provided.

Second session of the Aluminum and Magnesium Division comprised a roundtable luncheon held on Thursday noon. Dr. N. E. Woldman presided and discussion leaders were A. T. Ruppe, Bendix Products Division, Bendix Aviation Corp., South Bend, Ind., and G. H. Starmann, Apex Smelting Co., Chicago. Dr. Woldman pointed out that the newly formed division had appointed officers and various committees, and requested that all interested aid in carrying on the work. Officers include Dr. Woldman as chairman, Leslie Brown, Magnesium Fabricators Division, Bohn Aluminum & Brass Corp., Adrian, Mich., vice chairman, and R. E. Ward, secretary. Following his brief talk on the aims of the division Dr. Woldman threw the meeting open to a general discussion of aluminum and magnesium foundry problems.

Describes Molding Procedure

Final technical session on aluminum and magnesium was held Thursday night with Dr. Woldman presiding and M. E. Brooks, Dow Chemical Co., Bay City, Mich., acting as co-chairman. The meeting opened with a presentation of the committee report on "Recommended Practices for the Casting of Aluminum Alloys in Sand Molds." This extensive report is divided into 8 sections covering general recommendations and the various types of alloys used, including their characteristics. The former described molding procedure including the type of sand, facing gating and heading, and cores; melting and pouring equipment with information on types of equipment, precautions to be followed, fluxing and deoxidizing, and melting and pouring range; and finishing operations including heat treatment.

In the discussion which followed one member stated that he found it beneficial to superheat aluminum alloys to 100 to 150 degrees above the pouring temperature since it gave a finer grain. Another pointed out that with magnesium bearing aluminum alloys care should be taken to prevent loss of magnesium since it caused the alloy to become sluggish and hard to pour. One speaker stated that no more fluxing was required with secondary ingot than with primary ingot. A suggestion was made that it would be well worth while to compile the avail-

(*Continued on page* 180)

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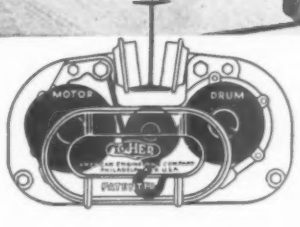

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(*Continued from page* 178)

able data on and investigate further the causes of pinhole porosity. Some discussion arose on the difficulty of meeting physical specifications in a test bar poured within 20 degrees of the casting pouring temperature in an aluminum alloy containing 5 per cent silicon, 1.25 per cent copper and 0.5 per cent magnesium. Some said that they had no trouble.

Second paper at the meeting was presented by A. E. Cartwright, Robert Mitchell Co. Ltd., Montreal, Canada, on "Fluoroscopic Examination of Light Alloy Castings" in which he described equipment for direct visual x-ray examination of castings with the aid of a fluoroscopic screen. The author pointed out that while the method has a number of disadvantages such as limited sensitivity and contrast, it may be employed in examination of unimportant low or non-stressed aircraft parts and other industrial light alloy castings for blow holes, heavy metal inclusions and fairly heavy shrinkage defects.

For highly stressed aircraft castings it is necessary to obtain the maximum sensitivity by radiographic inspection for acceptance tests. However, the fluoroscopic procedure may be used as a preliminary operation before radiographic examination. In that way major flaws may be detected and considerable film cost is saved. Fluoroscopic examination also can be used in establishing heading and gating procedure provided sufficient radiographic checks are made to insure that the smaller and finer defects are not overlooked.

Final paper of the session was on "Recent Improvements in Magnesium Melting and Aluminum Ladle Preheating Practice," and was presented by James Kniveton, Selas Co., Philadephia. Mr. Kniveton described a ladle preheater designed around a special form of ceramic cup, and fired by gas. A special carriage is used to hold the ladle in place, and it is claimed that the arrangement is such that uniform heating of sides and bottom is obtained. Numerous controls and a thermocouple inside the ladle permit proper and automatic heating. A detailed description of the unit was given in the July, 1942 issue of THE FOUNDRY on page 117.

The melting furnace employs 18 cup-type gas burners located around the periphery of the furnace which will take a 2000-pound capacity pot. Twelve of the burners are in the top row and 6 in the bottom, and each burner can be adjusted individually. A single valve actuated by a thermocouple in the molten metal controls the gas mixture to the burners to maintain the desired pouring temperature. An auxiliary couple in the combustion chamber prevents exceeding of a predetermined temperature on the outside of the pot. A brief description of the furnace was published in the March, 1943 issue of THE FOUNDRY on page 129.

STEEL FOUNDERS STUDY
Progress of Industry

HEAT treatment of medium carbon cast steel in moderately heavy sections was discussed by K. L. Clark, Naval Research Laboratory, Anacostia Station, Washington, at a session Thursday afternoon, presided over by R. A. Gezelius and John Howe Hall, both with the General Steel Castings Corp., Eddystone, Pa. The paper presented by Mr. Clark represented a joint effort of the speaker with H. F. Bishop and H. F. Taylor, also connected with the Naval Research Laboratory.

The paper covered in detail the results of a series of experiments to determine whether the time usually considered necessary to heat treat heavy sections of steel could not be reduced. The experimental work indicated that the time can be reduced to a considerable extent. Six 10x10x20 inch castings and six each of 2 types of test coupons were cast of approximately 0.25 per cent carbon steel. Castings and coupons were subjected to various heat treatments designed to shorten the annealing treatment usually applied to moderately heavy steel castings of this approximate chemical composition. Savings in heat treating time were achieved by accelerating heating rates, by reducing soaking periods and by utilizing air cooling and quenching. Physical properties were improved rather than harmed. The present report covers progress up to date. The authors of the paper are engaged in carrying on further work in this particllar field.

"Quantity Production of Manganese Steel," the annual exchange paper from the Institute of British Foundrymen, and prepared by J. W. Gardom, Sheffield, England, was presented by John Howe Hall. Those who have been privileged to hear Mr. Hall either on the floor or on the platform need not be told that the paper lost nothing in the presentation. His intimate association with production of manganese steel castings over a period of many years qualified him to comment, in some instances critically, on certain differences between American and British practice. However, he directed the attention of his audience to the fact that England has been under a war cloud for well over 3 years. Building a plant under these conditions and operating it with unskilled men and women as described by the author should arouse a feeling of admiration.

The second technical session on steel castings was held Thursday night with A. H. Jameson, Malleable Iron Fittings Co., Branford, Conn., presiding, assisted by H. H. Blosjo, Minneapolis Electric Steel Co., Minneapolis, co-chairman. First paper was entitled, "Making Cores for Steel Castings", by S. W. Brinson and J. A. Duma, Norfolk Navy Yard, Portsmouth, Va., and was presented by Mr. Brinson. Numerous slides were shown of cores and core arbors for large, high pressure castings in which no chaplets were permitted. The cores were made on cast iron arbors since that material can be broken when removing the core.

Because most of the castings are subject to cracking during contraction, the cores are made hollow in some cases and filled with coke or cinders in others. Mr. Brinson stated that while many foundrymen preferred the coke or cinder filled core, he believed better results were obtained with the hollow core. He also said that many of the cores are made with green sand copes, or tops using dry sand segments to carry the main crushing load. Oil sand, naturally bonded sand, and cement bonded sand are used for making the cores, and the speaker stated that his experience has been that a properly made oil sand core, within its limits for use, will make the best core for any metal.

Core Wash May Peel

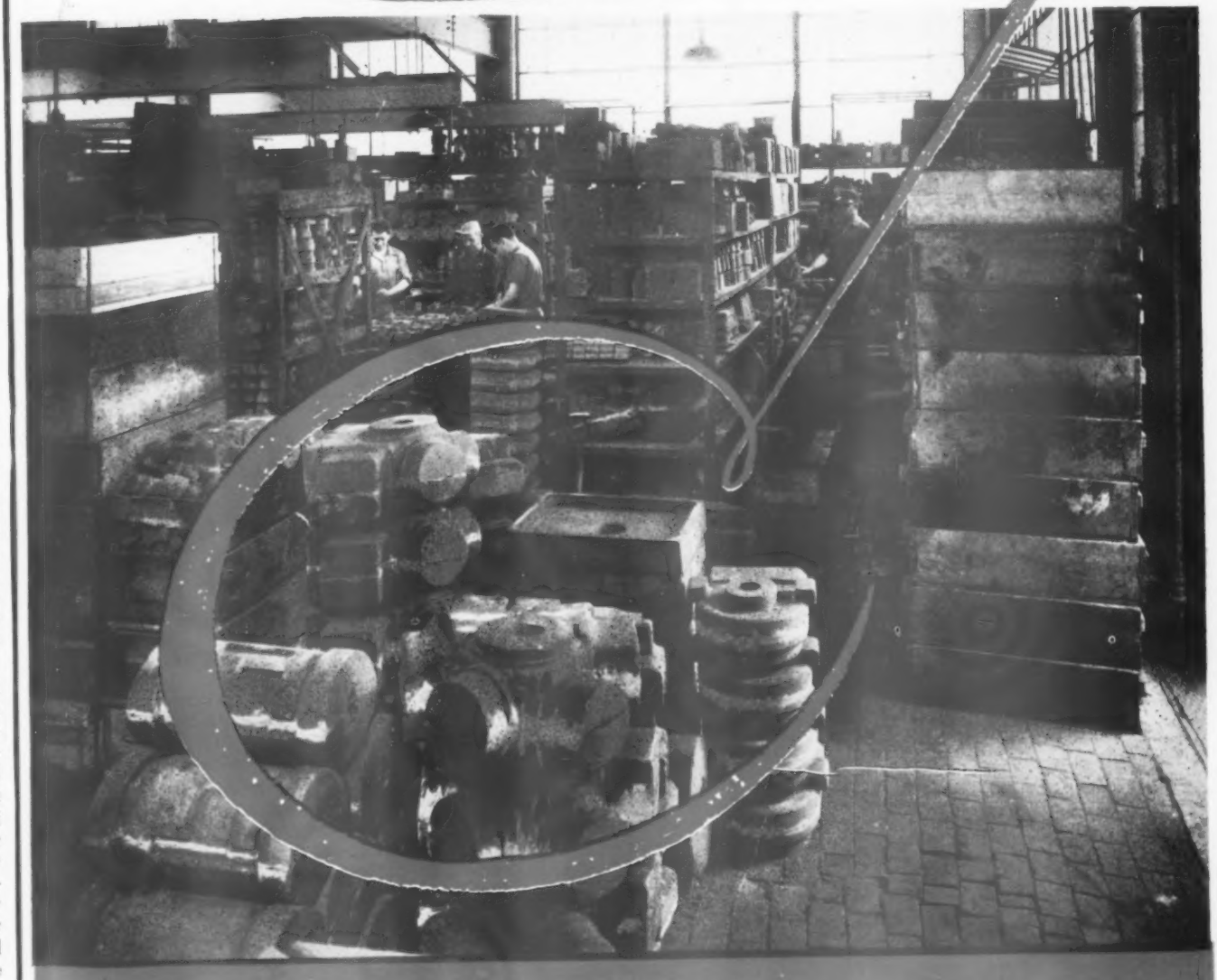
Oil sand cores used in steel castings should be washed with a silica wash without oil. The core surface should not be too smooth or glazed since that seems to promote a cleavage plane between core and wash material which causes the wash to flake or peel off. In response to a question whether a steel foundry without facilities of an iron foundry could afford to purchase cast iron arbors outside, Mr. Brinson stated that the arbors are made inexpensively in open sand.

Concluding paper on "Stress Relief and the Steel Casting," Mr. E. A. Rominski and H. F. Taylor, Naval Research Laboratory, Anacostia, Washington, was presented by Mr. Rominski. It described work under way at the laboratory on the problem of stress relief. Mr. Rominski pointed out the importance of proper stress relieving cycles and reasons why the work was being carried on. Intentions are that the data will be used by the Navy Department for writing new specifications for heat treatment of steel castings. Particular attention must be paid to various types, such as turbine castings, since any excessive stresses always are a potential source of danger in service and interfere with dimensional stability. When a casting is poorly stress relieved, large losses by cracking or warping may occur during welding, machining or even after being placed in service. Mr. Rominski pointed out that the problem has been divided into two parts, including an evaluation of the stresses imposed upon the casting during heating or cooling, and a determination of the rates of relief of stress (relaxation) as a function of temperature.

The first part being particularly troublesome and time consuming, has not been finished to date, but the method for solving the second part was described in detail. It involves the use of a com-

(*Continued on page* 182)

Just another fly in Benito's ointment!



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Norton Co. Adds Second Star to Its Army-Navy "E" Flag

Its third award for war production, Norton Co., Worcester, Mass., recently received the second star for its Army-Navy "E" flag. The original Navy "E" flag was awarded March 23, 1942, and the first star last Sept. 29. Left to right above are: Leonard R. Cutler; Alfred R. Messier; George N. Jeppson, president; Howard W. Dunbar, vice president; Capt. Gordon C. Hall, U. S. N. R.; Aldus C. Higgins, chairman of the board; Harold M. Holdredge; Andrew B. Holmstrom, vice president; Harry E. Howard; Peter J. Styffe and Robert H. Hunter

(*Continued from page* 180)

plicated machine designed to measure rates of release of stress at constant strain. In other words, a specimen is heated to a given temperature and stressed to a predetermined load, after which it is held at constant length, and the rate of decay of the locked up stress is measured with respect to time. Graphs were shown of the rates of relief of plain carbon (Class B) steel at temperatures of 1020, 1202 and 1382 degrees Fahr.

A final graph showing the time-temperature relation for 100 per cent stress relief was particularly interesting since it showed that rates of stress relief could be determined with extreme accuracy for any steel from two or more measurements at three or more temperatures. A rather novel means was used to show the effect of temperature on stress by discussing cylindrical pieces of steel, the concentric layers of which undergo temperature and stress differentials similar to those in the various members of a steel casting.

Mr. Rominski made several references to the classic work of Adams and Williamson on removal of strains in optical glass, and pointed out that at relatively high temperatures for the two materials, metal resembles glass in many respects, except that the mechanics of stress measurement is considerabliy more complicated for metals than it is for glass.

Third session on steel castings, held Friday morning with Charles W. Briggs, Steel Founders' Society of America, as chairman, was opened with a paper on "A Report on the Use of Aluminum in 10,000 Acid Electric Heats of Steel", by E. C. Troy, Dodge Steel Co., Philadelphia. Advantages in use of 0.10 to 0.15 per cent aluminum, according to Mr. Troy, included sounder castings with less likelihood of periodic pin hole trouble, more uniform tensile test results with few failures in ductility values, lessened strain on foundry personnel due to both of the previously mentioned points. Disadvantages include the fact that external shrinkage cavities generally are larger due to lack of internal porosity, coarse grain structure, is not obtainable, there probably is more likelihood of hydrogen contamination or retention, and the cost is increased through the addition of aluminum.

A question was asked as to the use of the viscosimeter to determine the amount of aluminum to be added. It was stated that the device was used only for controlling the metal for pouring, and could not be used for aluminum additions. In response to an inquiry on manganese content Mr. Troy said that it was maintained at 0.60 to 0.70 per cent. Where considerable slag was present it was advisable to remove the slag before making additions of manganese and silicon so as to get high recovery and better control. Asked about use of calcium-silicon Mr. Troy stated that he did not use it, but believed that it would remove hydrogen.

R. A. Gezelius, General Steel Castings Corp., Eddystone, Pa., and chairman of the Committee on Nondestructive Testing, reported results of a questionnaire on magnetic testing which was sent to steel foundries. Information indicated that 43 per cent of those replying had magnetic equipment available, and that the direct current apparatus was most popular. Most of those sending in replies stated that they would accept orders containing specifications involving magnetic testing although some would not. Some required a clause in the magnetic testing specification to the effect that chipping and grinding could be employed to ascertain whether or not the indicated defect was only on the surface. The report contained information on the types of machines used, amperage employed, whether the wet or dry procedure was followed, whether the current was alternating or direct, etc.

In the absence of C. E. Sims, Battelle Memorial Institute, Columbus, O., and chairman of the committee on methods of producing steel for castings, the report of the committee was presented by C. W. Briggs. Pertinent points in the report referred to the advances in production of cast armor, indicated the strong possibility that converter steel will be placed in good standing in the family of steel making equipment, and gave a brief description of the use of the rotary, fuel-fired furnace in England for the production of steel. Two principles in preparing steel for castings which are becoming more firmly established each year are the desirability of an oxidizing period or boil in each heat, and the undesirability of holding steel in the deoxidized condition for prolonged periods.

Fourth and concluding session of the steel division was devoted to foundry practice, with three papers on this subject. Fred A. Melmoth, vice president, Detroit Steel Casting Co., Detroit, presided, and H. D. Phillips, plant manager, Lebanon Steel Foundry Co., Lebanon, Pa., was co-chairman.

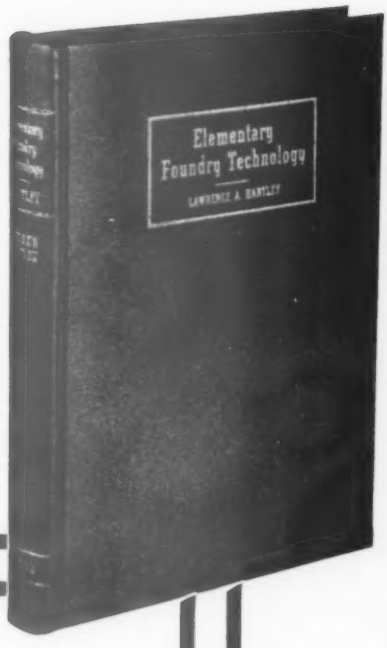
Most noteworthy was the contribution, "Hydrogen and Nitrogen as Causes of Gassiness in Ferrous Castings," by Carl A. Zapffe, research metallurgist, and Clarence E. Sims, supervising metallurgist, Battelle Memorial Institute, Columbus, O. According to the authors, gassiness in iron and steel is a function of hydrogen content and the changes in solu-

(*Continued on page* 184)

A Book Every Foundryman Should Use

"ELEMENTARY FOUNDRY TECHNOLOGY"

(REVISED, THIRD EDITION)



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In addition to the completely new chapter on malleable cast iron foundry practice, the chapter on pig iron is revised to make it conversant with present day practice. Additional references are included.

Well over half of the book is devoted to discussion of fundamentals of oundry practice, with special reference to the field of gray iron and steel manufacture. Foundry subjects covered include . . . Elements of Iron . . . Iron Manufacture . . . The Cupola and Its Operation . . . Elementary Problems in Steel Foundry Production . . . Brass Melting . . . Foundry Sands . . . Gates and Risers . . . Molding Machines . . . Core Machines . . . Long Life Molds . . . Malleable cast iron foundry practice.

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(*Continued from page* 182)
bility of hydrogen in metal which take place during solidification. Hydrogen is introduced into the liquid metal by means of carriers, the most common of which is moisture. Bubbles of hydrogen can form only when nucleating centers are present, and these generally are supplied by hydrogen-oxygen or other reactions.

Austenitic steel is less subject to gassiness and bleeding than ferritic steel, in the opinion of Messrs. Zapffe and Sims. This is true because the solubility of hydrogen in the solid metal is greater, and the gamma lattice-structure range, in which hydrogen solubility is high, is extended. The addition of deoxidizers replaces some of the hydrogen which would otherwise act as a deoxidizer, thus increasing the concentration of hydrogen gas in the metal. In exceptional cases, gassiness and bleeding may result from the release of nitrogen by unstable nitrides present in the metal. This occurrence may be prevented by addition of stabilizing elements such as titanium.

High commendation to the authors and much discussion followed this paper. J. B. Caine, metallurgist, Sawbrook Steel Casting Co., Lockland, O., in commenting upon the emphasis which had been placed on hydrogen, warned that foundrymen should not forget about oxygen. He also stated that while flushing out hydrogen with nitrogen works well in the laboratory, there are factors which make it difficult in shop practice.

Second paper, "Factors Influencing Ductility in Cast Steel," by G. A. Timmons, metallurgist, Climax Molybdenum Co., Detroit, was a highly technical paper detailing the procedure and results of an investigation on that subject.

Present status of the side-blow converter was reviewed in an interesting contribution by A. W. Gregg, executive engineer, Whiting Corp., Harvey, Ill., and F. B. Skeates, foundry superintendent, Link-Belt Co., Chicago. Forty-five new converters have been installed in the United States and Latin America since July, 1940, of which 39 are in this country. Insofar as is known, there are now 66 operating units in the United States and Canada, in 37 different foundries.

For years, converters in foundries were of 1-ton or 2-ton capacity, but today the tendency is toward larger sizes. Thirteen 3-ton are now in use, one of 5 tons, and four of 6 tons, and these larger sizes blow as rapidly as the smaller vessels. Electric eye control brought renewed interest in converters, and placed subsequent improvements, including all types of better control mechanisms.

Several methods have been developed for desulphurizing and dephosphorizing. Through a form of triplexing-melting in cupola, blowing in a converter, and holding or refining in the electric furnace, several foundries are able to pour steel castings on a continuous basis.

Steel Division roundtable luncheon held Friday noon was well attended. T. D. West, Deere & Co., Moline, Ill., presided, and was assisted by R. S. Munson, Atlantic Steel Casting Co., Chester, Pa., and A. H. Jameson, Malleable Iron Fittings Co., Branford, Conn. Discussion leaders included H. D. Phillips, Lebanon Steel Foundry Co., Lebanon, Pa., who spoke on "Atmospheric Pressures in Blind Feed Risers"; S. W. Brinson, Norfolk Navy Yard, Portsmouth, Va., whose topic was "Some Good 'Bad' Castings"; John Howe Hall, General Steel Castings Corp., Eddystone, Pa.; and G. A. Lilleqvist, American Steel Foundries, Chicago, who discussed miscellaneous steel foundry problems.

CONSIDERS GRAY IRON
As an Engineering Material

MAJOR portion of the first gray iron session Wednesday afternoon was given over to a paper on "Fundamental Relations Within the Cupola", by William A. Pennington, Mellon Institute, Pittsburgh. The session had Fred J. Walls, International Nickel Co., Detroit, as chairman and Dr. E. E. Marbaker, Mellon Institute, as vice chairman.

Mr. Pennington discussed results of an analysis of the basic principles involved in the melting of metal in the cupola. This study led to the setting up of certain equations intended to be used—within certain limitations—in ascertaining melting conditions. The speaker stated that since the percentage of CO in the cupola can be proved to be a function of CO_2 content, it is necessary to analyze for only the latter in determining both values, and that CO per cent in cupola effluent will equal 1.656 (20.8 — X), where X is per cent CO_2 and when per cent of oxygen in the air is 20.8. However, this equation is not to be used if limestone or any other carbon-gas producing substance is in the charge.

Other equations were given for determining CO_2 from limestone, and where the limestone is 25 per cent by weight of the total carbon, the CO content was said to equal 1.682 (21.28 — X). With the same limestone ratio the carbon burning rate (B) may be expressed $B = 0.0257C_1 \left(\frac{52.48 - X}{94.13 + X}\right)$, where C_1 is cubic feet of air per hour. In other instances the carbon burning rate is given by the equation $B = .00695C_1 \left(\frac{200}{100 + N_v}\right)$, where N_v is per cent CO_2 in total carbon gases, all from coke.

Several equations were developed for determining melting rate (D), the simplest—where iron-carbon ratio and air volume are constant—being $D = 40.48 \left(\frac{52.48 - X}{94.13 + X}\right)$. For all the equations, a type of dynamic equilibrium was assumed. A further assumption was that there are considerable fluctuations arising from layer charging, consequently the speaker recommended that the values be taken as an average over an exact whole number of periods. It was also suggested that coke size be taken into consideration in comparing different fuels, since smaller sizes cause formation of a larger percentage of CO and less CO_2.

Although Mr. Pennington stated that actual practice confirmed the applicability and usefulness of the equations, subsequent discussion from the floor indicated a rather general distrust of the theoretical and mathematical approach for determining values which the formulas are intended to ascertain.

Discusses Heat Treatment

Research conducted on the effect of heat treatment on physical properties of four grades of iron used in oil field equipment was described by Ernest R. Starkweather, Lufkin Foundry & Machine Co., Lufkin, Tex. The strongest grade, analyzing 3.24 per cent carbon, 1.29 per cent silicon, 0.74 per cent manganese, 0.126 per cent sulphur and 0.19 per cent phosphorus, had an as-cast tensile strength of 50,500 pounds and brinell of 255. After quenching at 1550 to 1600 degrees Fahr. with oil and drawing at 1100 degrees, tensile strength was 59,400 with 269 brinell, while after drawing at 1000 degrees, tensile was 63,500.

Largest percentage increase in tensile was shown in a grade having strength of 44,000 pounds as cast and 61,500 pounds after drawing at 900 degrees. Hardness in all grades increased proportionately as the drawing temperatures were lowered.

The concluding paper was a review of a Spanish study of quenched gray cast iron, a condensation of a thesis by Dr. Antonio Modolell, Barcelona, Spain. It was translated by F. R. Morral, Pennsylvania State College, and read by William A. Pennington. The author was commended for his study, in view of the handicaps of inadequate equipment under which he worked. Effects of various treatments on properties of gray iron were described, although inability to show slides of tables and microphotographs accompanying the paper detracted from its presentation.

The first section of a series of three comprising a "Symposium on Gray Cast Iron as an Engineering Material" was held Thursday afternoon with Dr. A. E. Schuh, U. S. Cast Iron Pipe Co., Burlington, N. J., as chairman and Tom E. Barlow, Vanadium Corp. of America, Detroit, as vice chairman. The subject was opened by R. G. McElwee, Vanadium Corp. of America, and War Production Board, Washington, who point-

ed out that the gray iron foundry industry had been weak in sales effort due to the lack of information on engineering properties of its product. The present symposium was designed to provide usable data on those properties. Mr. McElwee urged all gray iron foundrymen to send in information based on experience or test which might be of value. He also mentioned that such properties as wear resistance, damping capacity, etc., were of more interest to the engineer than tensile strength.

C. O. Burgess, Union Carbide & Carbon Research Laboratories, Niagara Falls, N. Y., and War Metallurgy Committee, presented a "Report of a Survey of High Temperature Properties and Applications of Gray Iron" in which was stated that the American Society for Mechanical Engineers Boiler Code established in 1914 and still in force limited the use of gray iron castings to temperatures not over 450 degrees Fahr. However, the survey pointed out that data was obtained on 233 applications of gray iron in temperature ranges up to 1000 degrees and over, with few failures. Those indicated that the material is serviceable at higher temperatures, and the specifications should be reviewed and brought up to date.

Divided by Temperature Range

The 233 applications were divided into 4 classes of temperature range, namely 451 to 600 degrees; 601 to 750 degrees; 751 degrees to 1000 degrees, and over 1000 degrees. In the first or 451 to 600 degree range 93 applications were reported with only 9 failures. Most of the applications included pressure as well as temperature, and the applications served satisfactorily up to 28 years. In the second or 601 to 750 degree range 63 applications were reported with service up to 50 years. In the 751 to 1000 degree range 30 applications were successful with service up to 15 years. At temperatures over 1000 degrees 47 applications with one failure were reported. Most had a limited life although some served up to 10 years.

In general the survey indicated that for elevated temperature work gray irons of the inoculated or alloy type were more serviceable, and the tensile strengths were 30,000 pounds per square inch minimum, with an average of around 40,000 pounds per square inch. Also the irons mainly were of the low or medium carbon type in that the carbon plus 0.3 times silicon plus phosphorus factor ranged from 3.4 to 3.9 per cent. Mr. Burgess stated that those supplying information to the survey were unanimous in opinion that gray iron is serviceable at temperatures over 450 degrees Fahr., and the majority believed that the range could be extended to 600 to 750 degrees. He pointed out that in developing specifications for elevated temperature applications it might be well to include minimum tensile strength value, composition range, and melting procedure.

Second paper on the program was by James S. Vanick, International Nickel Co. Inc., New York, and discussed the "Heat Treatment of Cast Iron". Mr. Vanick confined his talk to three types of heat treatment including stress relief anneal, full anneal, and quench and temper treatment. In general the critical temperature or transformation range for cast iron is between 1200 and 1400 degrees Fahr., and in stress relief annealing the castings are held below that range to prevent any marked change in physical properties. In the case of weak irons the range may be as low as 800 to 900 degrees Fahr. while in the case of high alloy irons the temperature may be 1100 degrees.

In full annealing the temperature employed may be in the critical range or above, depending upon the results desired. If it is desired to soften the casting for easy machining, it may be heated in the critical range or somewhat above, say 1500 to 1600 degrees, and then furnace cooled. If a definite microstructure is desired the casting may be heated to 1750 degrees, and air cooled under predetermined conditions. For quenching and tempering treatment to obtain high hardness the castings are heated to around 1600 degrees, quenched in oil, and then drawn at lower temperature to secure the results desired. For high hardness the temperature may be 400 to 500 degrees and furnace cooled, but if it is more desirable to have increased tensile strength with medium hardness the temperature may be 800 to 1000 degrees. A variation of the tempering process called hot quenching or isothermal treatment is to quench from the high temperature in a bath of hot liquid maintained at 400 to 800 degrees Fahr. That is said to provide extreme toughness.

Discuss Physical Properties

Second session of the gray iron symposium, held Friday morning, was concerned with various physical properties of the material. Victor A. Crosby, Climax Molybdenum Co., Detroit, was chairman of the meeting. In discussing the modulus of elasticity of gray cast iron, A. J. Herzig, Climax Molybdenum Co., Detroit, pointed out that the amount, size and shape of graphite have an important influence on the modulus, the latter declining with an increase in percentage of graphitic carbon. He indicated that values should be considered as relative rather than absolute.

Results of various impact tests on gray cast iron were described by Dr. James T. MacKenzie, American Cast Iron Pipe Co., Birmingham. Microphotographs were shown of different samples of iron together with tensile, impact and hardness values. Grades having tensile strengths of 26,000, 48,000, 51,000 and 55,000 pounds, respectively, had corresponding impact values of 25, 52, 74 and 137 foot pounds and brinell readings of 500, 266, 270 and 234. Index of toughness of the material was expressed as the square of the figure represented by dividing the modulus of rupture by the modulus of elasticity.

Later discussion brought out the point that data on impact properties as yet have not been correlated to the point where the material can be readily used by engineers and designers.

In describing dampening properties of gray cast iron, Fred J. Walls, International Nickel Co., Detroit, emphasized that high dampening capacity in iron having moderate strength may prove more suitable from the standpoint of fatigue resistance than low dampening property combined with higher tensile strength. Dampening properties were said to be influenced by various factors, including form and content of graphite and modulus of elasticity, being inversely proportional to the square root of the latter.

John Lowe, Battelle Memorial Institute, Columbus, O., presided over the third session devoted to the "Symposium on Gray Cast Iron as an Engineering Material", in which "Relation of Microstructute to Properties", was discussed by W. E. Mahin, Westinghouse Electric & Mfg. Co., Pittsburgh; "Compression and Torsion Properties", by Fred G. Sefing and J. S. Vanick, International Nickel Co., New York; "Wear Resistance", by Paul S. Lane, Muskegon Piston Ring Co., Muskegon, Mich.; and "Transverse and Tension Strength and Deflection", by Fred J. Walls, International Nickel Co., Detroit.

Note Test Bar Fracture

Answering a question from the floor Mr. Lane pointed out that the factor of wear in a casting is rather indefinite since resistance to wear depends on many conditions. Iron to resist one type of wear might be entirely nonresistant to another cause. Conditions under which wear takes place must be known so that a suitable metal may be developed. Work in the laboratory supplies clews on which to base conclusions. Factors to be considered include corrosion, lubrications, structure, chemical composition. Any one of these may be more important than the others. To the experienced observer, a test bar fracture is a fairly reliable indicator of whether the metal will serve satsfactorily under given conditions.

Commenting on the microstructure slides, a member suggested that all slides should be prepared by one member of the committee to insure accurate and comparable results. Although proper polishing procedure has been outlined by the committee, it is well known that the work of all operators is not exactly alike. Mr. Vanick described the work of the committee in preparing a table to show relationship between compression and tensile strength. He also quoted instances where cast iron stood up better than steel under heavy loads.

Because of the large number of papers presented at the War Production Foundry Congress, space limitations prevent inclusion in this issue of reports on all technical sessions. Concluding reports will appear next month.

THE EDITORS

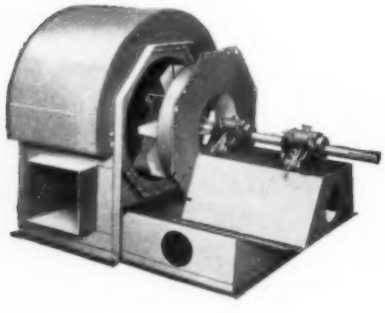
NEW EQUIPMENT and SUPPLIES

Radiographic Markers

H. W. Knight & Son Inc., Seneca Falls, N. Y., is offering radiographic identification markers consisting of lead letters and figures which may be readily attached to castings, forgings or machined parts for making a permanent record on radiographs. Markers are thick and broad so that good resistance to diffused rays is offered. They are offered in various sizes.

Temperature Fan

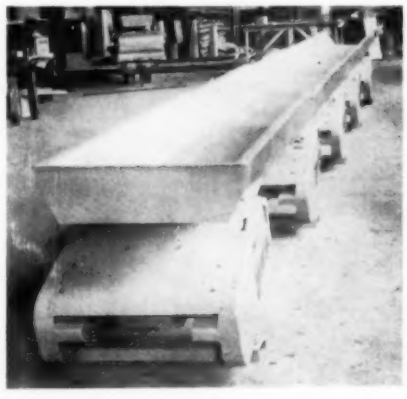
Mahr Mfg. Co., Eighteenth Avenue and Second Street, Minneapolis, has designed a new series of recirculating fans for high temperature work up to 1500



degrees Fahr. Available in ten sizes with capacities ranging from 800 to 40,000 cubic feet per minute, they may be assembled in 16 standard discharge positions without cutting, welding or rebuilding. Rotor, shaft, bearings and mounting can be pulled out as a unit for inspection or servicing. These fans are standard equipment on the company's furnaces and ovens.

Vibratory Conveyor

Syntron Co., Homer City, Pa., has developed a series of long vibratory conveyor equipment in various styles and capacities. Illustrated is a 35-foot section of a flat pan type conveyor 130-feet long for handling extremely hot materials. Conveying action is accomplished by high-speed vibration set up by multiple, pulsating driving magnets which eliminate use of motors, gears, rollers, etc. Magnets may be located either below or above the trough, and either floor mounted or cable suspended. Control of rate of flow is by rheostat. Troughs are supplied in either flat pan type or in sealed tubular sections.

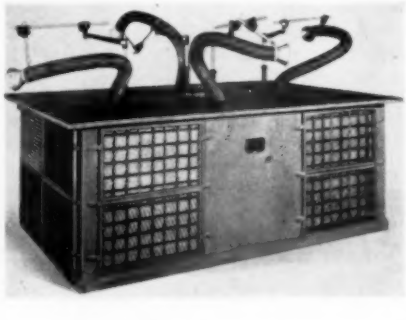


Electronic Drive

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., is offering an adjustable-speed electronic motor drive which permits use of alternating-current power to drive direct-current motors over a wide speed range. Representing refinements of similar systems previously furnished, the new drive consists of a thyratron tube rectifier which takes power from an alternating-current line and rectifies it into direct-current output. Smaller tubes provide rectified direct current for the motor field. Speed range as high as 100 to 1 is obtainable.

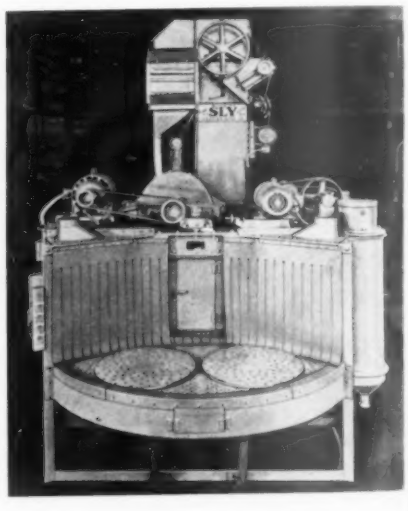
Grinding Bench

Schmieg Industries, 308 Piquette Avenue, Detroit, has developed a new four-station grinding bench with integral dust collector for use with portable grinders on non-hazardous materials. High velocity suction is concentrated at the dust source by means of flexible hoses attached to swivel connections. Finer particles are removed by filters, a special plenum chamber removing heavy particles. Bench is rugged wood frame construction, permitting attachment of grinding heads and figures, and is equipped with a heavy wood top, masonite covered. Unit is furnished complete with fan, four suction hoses, motor and push button starter.



Blast Cleaning Unit

W. W. Sly Mfg. Co., 4700 Train Avenue, Cleveland, has introduced a new multiple table blast cleaning machine. Unit illustrated has six 30-inch diameter tables which revolve around a common axis. Same machine may be equipped



with more tables or spindles of smaller size. Pieces to be cleaned are placed on the tables and upon entering the blast chamber are rotated under the blast. Movement of the tables through the blast chamber and their rotating speed are adjustable. Blast cleaning action is of the centrifugal type. Abrasive feed and direction of blast are readily controlled.

Welding Glass

Willson Products Inc., Reading, Pa., announces an improved welding glass blue in color that is said to allow better vision than the usual green glass for aluminum and bronze welding where sodium yellow glare is present. Standard green glass still is recommended for acetylene and electric arc welding.

Activities of FOUNDRY GROUPS

St. Louis

REGULAR meeting of the St. Louis District Chapter of the A.F.A. was held April 8 at the DeSoto Hotel. Meeting was opened by Chairman C. B. Shanley, Semi-Steel Casting Co. Upon a vote by the membership it was decided to hold the chapter's annual picnic in June. Chairman Shanley then called on L. A. Kleber, General Steel Casting Co., and chairman of the banquet committee for the A.F.A. War Congress, and he explained in detail the arrangements made for handling the banquet.

E. A. Goerger, chairman, Apprentice Training committee, reported on the winners in the local contest and who participated in the national contest during the convention. Judges were: Carl G. Dabler Jr., American Steel Foundries, East St. Louis, Ill.; Fred Bergmann, American Pattern & Model Co., and Louis Maier, Missouri Pattern Works. Following were the winners among the six contestants: Arthur Hansen, City Pattern & Model Co.; Russell Gabrielson, Central Pattern Co.; and Ralph Peterson, City Pattern & Model Co. There were no entries in the molding contests.

Carl Morken, chairman of the nominating committee then presented the committee's report. Those nominated and subsequently elected are: Chairman, L. A. Kleber, General Steel Casting Co.; Vice Chairman, E. Eugene Ballard, National Bearing Metals Co.; Secretary-Treasurer, J. H. Williamson, M. A. Bell Co. Directors: Roy A. Jacobsen, Carondelet Foundry Co.; John W. Kelin, Federated Metals Division, American Smelting & Refining Co.; Harold Wiese, Midvale Mining & Mfg. Co.; Joseph D. Walsh, Scullin Steel Co.

Mr. Kleber then introduced the speaker of the evening, Harry W. Dietert, Harry W. Dietert Co., Detroit, whose subject was, "Behavior of Mold and Core Surfaces at Elevated Temperatures." With the accompanying four reels of color motion pictures, Mr. Dietert gave a vivid description of the reactions of core and mold surfaces at pouring temperatures. After each reel of pictures, there was a lively discussion period.—*John H. Williamson, secretary-treasurer.*

Southern California

MARCH meeting of the Southern California Chapter of the A.F.A. was held on the eighteenth at the Los Angeles Elks Club. The meeting was presided over by Earl Anderson, Enterprise Foundry Corp., president, and the program was handled by Walter Haggman, Foundry Specialties Co., Huntington Park, Calif., vice president and program chairman.

Program for the evening was called "Home Towners Night" and the various speakers covered many phases of foundry practice. Ed. Green, metallurgist, Axelson Mfg. Co., gave a short talk on "Heat Treatment"; Richard Hughes, Pacific Metals Co., "Grinding Wheels"; William Emmett, Los Angeles Steel Casting Co., "Core Ovens" and John Wilson, metallurgist, Climax Molybdenum Co., "Ladle Additions". After each talk the meeting was open to discuss the topic just covered. The motion picture, "Heat Treat Hints" was shown through courtesy of the Lindberg Engineering Co., Chicago, and proved of great interest.

The nominating committee was appointed and includes: Earl Anderson, B. G. Emmett, Robert Gregg, Earl Shoemaker, Bert Popperwell, A. Rau, and E. Sechrist.—*E. M. Hagener, secretary.*

Quad-City

REGULAR meeting of the Quad-City Chapter of the A.F.A. was held at the Fort Armstrong Hotel, Rock Island, Ill., April 19, with 57 members in attendance. Alex Matheson, French & Hecht Inc., Davenport, Iowa, and chairman of the chapter, presided. Plans were outlined for the group's annual picnic to be held June 19 at Seventh Street and Rock River, Moline, Ill.

Carl F. Joseph, research metallurgist, Saginaw Malleable Iron Division, General Motors Corp., Saginaw, Mich., was the speaker of the evening. Mr. Joseph's subject was "Armasteel, Its Manufacture, Control and Application," A number of pictures were displayed showing production castings used in the automotive, refrigeration, and armament fields. At present large tonnages of the metal are being poured for machine gun parts, such as support barrels, slides, trunnion blocks, trunnion adapters and trigger guard bodies. Mr. Joseph illustrated various castings produced of the material which formerly were made of

Large attendance marked the Feb. 6 meeting of the Western New York Chapter of the A.F.A. held at Rochester

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steel forgings and showed that considerable savings in weight and machining are possible through substitution of cast parts.

In many instances, manufacturers are flame hardening critical points on the castings for superior wearing quality. A rockwell hardness of C-48 is standard with many users. The speaker outlined postwar possibilities for the product and stated that it will probably afford keen competition with gray iron, steel forgings, and aluminum in the future.—*H. L. Creps, recording secretary.*

Western Michigan

SIXTY members and guests of the Western Michigan Chapter of the A.F.A. met at the Ferry Hotel, Grand Haven, Mich., April 12, to hear Dave Reeder, Electro Metallurgical Co. Mr. Reeder's subject was, "Acid Electric Furnace Practice". One of the important points brought out was the necessity of having strong oxidation in the furnace. General discussion followed the talk.

Membership Chairman, C. M. Clover, Clover Foundry, reported the outstanding achievement of obtaining 22 new members from Campbell, Wyant & Cannon Foundry Co.

George W. Bettes, Sparta, Mich., showed some interesting movies, one of which pictured the engineering feat of a tribe of African pygmies in building a hanging vine bridge over a crocodile-infested river.—*K. C. McCready, secretary.*

Reading

SEVENTY-five members and guests were present at the regular meeting of the Reading Foundrymen's Association held at the Berkshire Hotel, Reading, Pa., April 20. Capt. P. H. Carlson, in charge of production service branch, Philadelphia Ordnance District, was the principal speaker.

Drawing a comparison between the ordnance requirements in World war I and those of today, Capt. Carlson said that in 1918 the total Army war expenditures amounted to five and a half billion dollars, while those for the present war have reached the staggering total of 52 billion dollars in addition to expenditures for the Air Corps and Navy. Praising industry for its splendid co-operation, he cited figures showing tremendous expansion of war production.

Captain Carlson said: "Americans are innately peace loving, and during the early '20's it was difficult to get sufficient appropriations from the government to make adequate tools of war or to conduct proper experiments on new weapons. Army Ordnance department, through the facilities of its six manufacturing arsenals, made a valiant effort, and when the present conflict broke was prepared with blueprints and plans for most of the material that was needed. Establishment of 13 ordnance districts and the decentralization of the awarding of contracts eliminated much of

the confusion and delay experienced in '17-'18 and gave the creative genius of American industry a chance to produce."

Calling the present war a "steel alloy war", Captain Carlson told of many conversions from critical materials to others in the production of practically everything used by the Army, and cited what the Army itself is doing to conserve strategic metals. The speaker stated that during the last war when equipment was damaged, it was left and more was obtained. This time, due to the exceptionally heavy demands, more than 40 different types of mobile machine shops have been designed, and badly needed equipment is repaired and reconditioned in the field. The method was adopted in order to save time, man-hours and material. Captain Carlson stated that the war is far from won and unless even greater production is assured to keep up the destruction, we will be in a bad way. H. P. Good, president of the local association, introduced the speaker. — *H. C. Cummings, secretary.*

Central Indiana

FINAL meeting of the current season for the Central Indiana Chapter of the A.F.A. was held May 3 at the Washington Hotel, Indianapolis. B. P. Mulcahy, Citizens Gas & Coke Utility, Indianapolis, and chairman of the chapter, presided. Harold H. Lurie, Cummins Engine Co., Columbus, Ind., served as technical chairman and introduced the speaker, Victor A. Crosby, Climax Molybdenum Co., Detroit.

Mr. Crosby discussed alloys and showed the various results of alloys and combinations of alloys in irons as well as steels. The question and answer period was long due to the fact that everyone present had specific questions which he wanted answered.—*Ralph A. Thompson, secretary.*

E. Canada - Newfoundland

ANNUAL meeting of the Eastern Canada-Newfoundland Chapter of the A.F.A. was held April 16 at the Mount Royal Hotel, Montreal, and was the final get-together for the 1942-43 season.

Retiring Chapter Chairman C. C. Brisbois, in reviewing the progress made during the initial season, expressed his gratification and pride in having been chosen as the baby chapter's first chairman. He expressed the thanks of the chapter to the various companies which have supported it by memberships and financial contributions, by advertising, sponsoring of programs and many other valuable forms of aid and encouragement. Chairman Brisbois also warmly thanked the executives and committee members for their loyal support, and in conclusion welcomed the newly elected chairman, M. L. Doelman, Electric Steel Ltd., Cap De La Madaleine, Que., who promised the chapter his best efforts to

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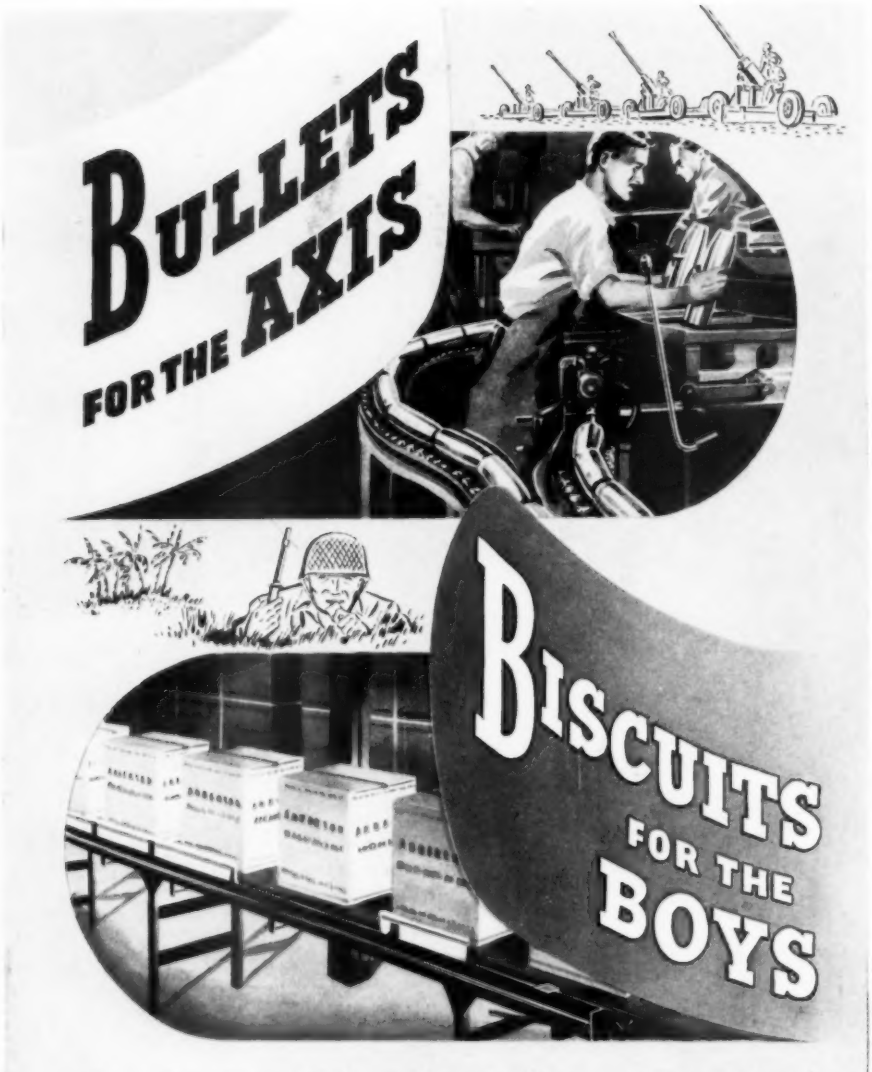

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E. M. Delahunt, membership committee chairman, presented a report showing a total enrolled membership of 177 for the season. The fine showing represented enthusiastic effort on the part of all the directors and many members, special mention being accorded Chapter Chairman C. C. Brisbois for highest enrollment of members. Financial report was presented by R. E. Cameron in the absence of Andrew Webster, and showed a substantial working balance. G. E. Tait, papers committee chairman, reported on the activities of that group and thanked the various sponsors of speakers and his committee associates.

Officers for the coming season elected unanimously by the members present are: Chairman, M. L. Doelman; vice chairman, E. M. Delahunt, Warden King Ltd.; secretary-treasurer, A. R. Webster, Webster & Sons Ltd. Directors elected to serve three years: W. E. Baxter, Crane Ltd.; A. E. Cartwright, Robert Mitchell Co. Ltd.; C. Hacker, Hull Iron & Steel Co. Ltd.; A. R. Woods, Canadian Foundry Supplies & Equipment Ltd. P. Dauncey, Canadian Ingersoll Rand Ltd. was elected a director to serve two years.

Subject of discussion for the evening was "Prevention of Casting Defects due to Sand," by C. A. Sanders, American Colloid Co., Chicago. Mr. Sanders gave an interesting lecture illustrated with slides in which the distinctive qualities of three different types of bonding clays, western bentonite, southern bentonite and fire clay were described. Cracked castings were attributed to too high hot strength in molds, and the speaker described means of overcoming that defect by proper selection of the bonding agent to give adequate green strength and permeability while providing collapsibility in the hot short range during solidification of alloys. Some striking results of tests made to determine the heat penetration through sand molds also were shown, the heating of the sand being demonstrated as rapidly dissipated as the distance from the metal surface increased.—*A. E. Cartwright.*

Birmingham

GUEST speaker at the April 16 meeting of the Birmingham District Chapter of the A.F.A. was Harold J. Roast, vice president and metallurgist, Canadian Bronze Co. Ltd., Montreal, Canada. Mr. Roast, a past president of the former Canadian Section A.F.A. has been an active and outstanding leader in the nonferrous branch of the foundry industry for many years. His subject was "Silicon Bronze Castings" which he illustrated with a series of slides. At the conclusion of the talk, Mr. Roast answered a number of questions.

D. P. Forbes, president of the A.F.A. was present on an official visit and made an interesting talk, with special reference to the annual meeting of the association at St. Louis.

The chapter held a special meeting

April 23, when Harry W. Dietert, Harry W. Dietert Co., Detroit, presented a picture entitled, "The Behavior of Sands and Cores at Elevated Temperatures," which covered a problem facing all foundrymen. His discussion of the subject was interesting and instructive.—*H. B. McLaurine, reporter.*

Chicago

WITH its May 3 meeting, the Chicago Chapter of the A.F.A. concluded its activities program for 1942-43 and at the same time demonstrated convincingly the popularity of roundtable discussions. Attendance for the fourth such roundtable program was 160, comparing favorably with figures for previous similar meetings. Likewise notable, as it has been throughout the season, was the sustained interest of the nonferrous and pattern divisions, as evidenced by attendance at their discussion.

Following the customary plan, five group meetings were conducted, each with a chairman and one or more discussion leaders. F. B. Skeates, foundry superintendent, Link-Belt Co., Chicago, and W. H. Parker, Continental Roll & Steel Foundry Co., East Chicago, Ind., were discussion leaders in the steel session, the subject being "Gating and Risering." H. A. Forsberg, general superintendent, Continental Roll & Steel Foundry Co., presided. Among topics given attention was use of the "firecracker" riser.

George S. Evans, metallurgist, Mathieson Alkali Works Inc., New York, headlined the gray iron division session on "Changes in Gray Iron Brought About by the War, and Lasting Effects Upon the Industry," H. Kenneth Briggs, sales metallurgist, Miller & Co., Chicago, was chairman. Mr. Evans covered broad territory in connection with cupola operation, chiefly slagging, fluxes and trends in design. A point given considerable emphasis was that money spent now in improvements will net substantial dividends in the future, after the war is won and competition again becomes wide open.

"Metallurgy of Malleable Iron" was the subject for the malleable division, with Frank E. Clark, president, William E. Pratt Mfg Co., Joliet, Ill., as discussion leader. L. J. Wise, manager, industrial sales, Chicago Malleable Casting Co., Chicago, was chairman.

Nonferrous division concentrated its attention upon "Aluminum and Magnesium," with Dr. R. F. Thompson, Chicago Dodge Division, Chrysler Corp., Chicago, as discussion leader. Chester Faunt, Christensen & Olsen Foundry Co., Chicago, was chairman.

Phillip McNamee, assistant superintendent in charge of vocational education, Board of Education, Chicago, and F. K. Ferguson, superintendent of vocational education, Board of Education, East Chicago, Ind., were joint discussion leaders at the pattern division session, on the topic "Co-operation of the Pattern Shops, Foundries and Trade Schools." Roy Schroeder, Washburne Trade School, Chicago, was chairman.

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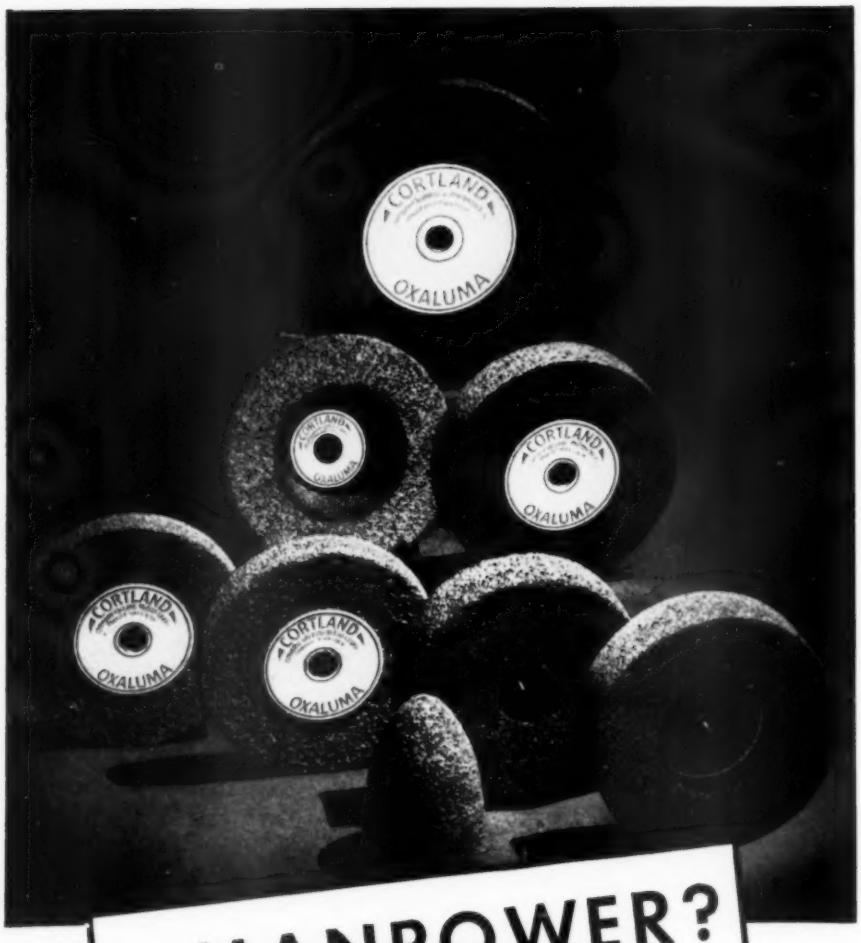

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At the dinner preceding the round-table sessions, A. G. Gierach, works manager, American Manganese Steel Division, American Brake Shoe Co., Chicago Heights, Ill., retiring chairman of the chapter entertained reports from committees on their activities of the year. Chairman-elect M. F. Becker, vice president, Whiting Corp., Harvey, Ill., then presented the past chairman's statuette to Mr. Gierach as a token of his service to the chapter during the year.—*Erle F. Ross.*

Philadelphia

APRIL meeting of the Philadelphia Chapter of the A.F.A. was held at the Engineers Club, April 9, with an attendance of approximately 150 members and guests.

First speaker was Capt. P. H. Carlson, Ordnance Department, Philadelphia district, on the subject "Battlenecks". With the aid of an illustrated booklet which was distributed to those present, he pointed out the work that has been done on the conservation of metals through changes in design of vital war items. He also explained that if all members of the industry do their part to supply the armed forces with the required weapons, it would be necessary to apply all experience and ingenuity to find new ways and methods to increase production and save critical materials.

He stated that when World War I was about over, a great deal of the material manufactured in this country had not reached Europe, and that it was necessary for us to use equipment manufactured and supplied by the French and British. He also declared that the first 16-inch gun made by the United States in the war, was not completed until 2 months after the war was over.

Present decentralized purchasing and supervision system which is in operation by the Ordnance Department in 13 districts of the country, is the result of lessons which were learned in the last war when it was necessary for industry to go to Washington in order to secure orders or help in obtaining materials. Credit is due to present Army officials of the Ordnance department who since 1918 laid groundwork for the present organization.

Technical speaker of the evening was John A. Sweeney, Florence Pipe Foundry & Machine Co., Florence, N. J., who was introduced by Technical Chairman John Spencer. Mr. Sweeney's talk supported the appeal of Captain Carlson for use of every method by which production can be increased and morale of workers improved. Mr. Sweeney detailed what has been accomplished in his plant, and cited production figures to prove that safety and good housekeeping in the foundry actually pay dividends.

The system used is unique in many ways. For instance, only the amount of tools and equipment actually required to perform any one job or operation are allowed. Workers are penalized when

more than the necessary tools and equipment are found in the working area. A reward system is used whereby payments are made to various groups which in any 2-month period improve or maintain the safety and good housekeeping rules and regulations. Mr. Sweeney pointed out that it is not the problem that most foundrymen think it is to establish such a system, but that workers must be appealed to in a manner to stimulate their interest and not by ordinary signs and slogans which a great many plants resort to without obtaining the necessary results.

Subsequent discussion indicated many listeners saw opportunities for practical application of various of Mr. Sweeney's suggestions.—*William S. Thomas, chairman, publicity committee.*

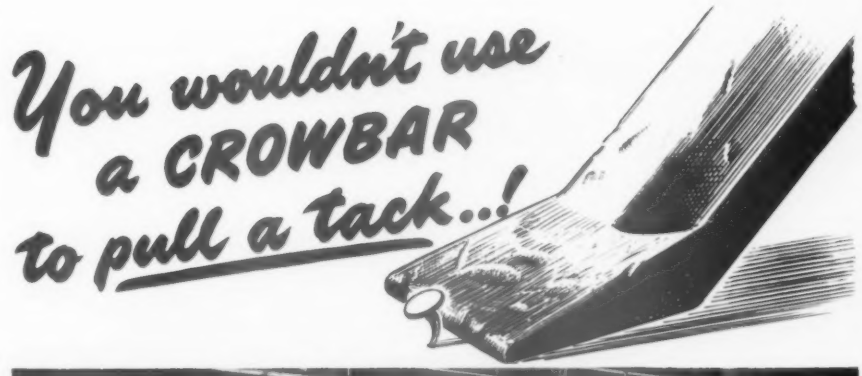
Metropolitan

WINDING up the current season, members and guests of the Metropolitan Chapter of the A.F.A. at the May 3 meeting at Newark, N. J., heard a fine lecture on "Making Castings Sound" by G. H. Blackburn, Walworth Co., Greensburg, Pa. Alexander McIntosh, Wright Aeronautical Corp., Paterson, N. J., was technical chairman.

Before the talk, Secretary K. A. DeLonge, International Nickel Co., New York, was instructed by Chairman Fred Sefing to cast a unanimous ballot for the following officers nominated for the 1943-44 season: Chairman, J. W. Reid, R. Hoe & Co., Dunellen, N. J.; vice chairman, T. D. Parker, Climax Molybdenum Co., New York; secretary, F. A. Foxall, Eclipse Aviation Division, Bendix, N. J.; treasurer, H. B. Caldwell, Whiting Corp., New York. New members of the board of directors are H. L. Ullrich, Sacks-Barlow Foundries Inc., Newark; K. V. Wheeler, American Steel Castings Co., Newark; J. A. Bukowski, Worthington Pump Co., Harrison, N. J.; W. D. Schoonmaker, General Bronze Corp., Corona, L. I., N. Y.; H. C. Seidel, Penn-Rillton Co., New York. W. A. Kellogg, National Engineering Co., was elected to fill the unexpired term of J. W. Reid.

Henry Seidel, chairman of the past chairman token committee, then presented D. J. Reese, International Nickel Co., R. J. Allen, Worthington Pump Co., W. E. Day Jr., Mack Mfg. Co., New Brunswick, N. J., and N. E. Woldman, Eclipse Aviation Division, and Fred Sefing, International Nickel Co. with attractive fountain pens in recognition of the excellent jobs they have done as chairmen of the Metropolitan chapter. K. A. Delonge also was presented with a pen in appreciation for the excellent work he has done as secretary for the past two years.

Mr. McIntosh then read an exchange paper written by W. Gladwell of the Mallory Metallurgical Products Corp. of England. The paper, entitled "Use of Radiography in Foundry Practice," was in exchange for W. G. Reichter's paper which was read at the last meeting of the chapter and submitted to the Insti-



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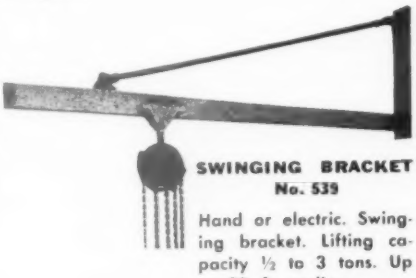

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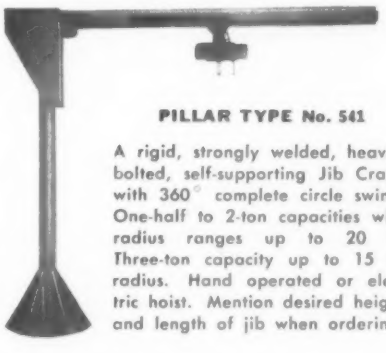

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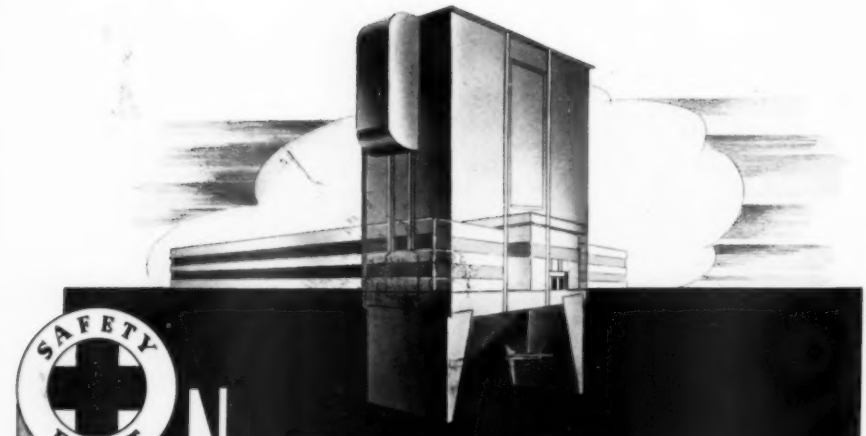

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AMERICAN HIGH EFFICIENCY DUST COLLECTORS

tute of British Foundrymen. Mr. Gladwell's paper reviewed in general the British practice for detecting and remedying imperfections usually found in sand castings.

Mr. Blackburn then presented his paper in which he discussed advantages and disadvantages of x-ray and gamma ray inspection and their applications. Mr. Blackburn pointed out that gamma ray inspection of pressure castings could be accomplished very readily and, in the case of large ferrous castings, more satisfactorily than by x-ray. He also showed the technique used for making radiographs and pointed out in detail methods for making the maximum number of photographs at a single time from each radium capsule.—*R. E. Ward, chairman, publicity committee.*

New Jersey

IT IS probable that some form of price control will continue for a period after the close of the war. If a post-war depression occurs, it is quite possible that instead of placing a ceiling over prices, price regulations will put a floor under prices by prohibiting sales below cost, somewhat along the lines of the old NRA. The extent to which any industry can benefit from such a program will depend upon the extent to which it has adopted sound and uniform cost methods. At present cost methods in the gray iron foundry industry vary greatly and many of them are unsound. It is therefore important that the industry make use of the next year or so to get its cost practice on a sounder and more uniform basis.

This admonition was voiced by John L. Carter, cost consultant of the Gray Iron Founders' Society, before members of the New Jersey Foundrymen's Association at its regular meeting at the Downtown Club, Newark, April 26.

He said the use of sound cost methods is particularly important at present, not only because of the post-war outlook, but because gray iron foundries are now subject to Maximum Price Regulation No. 244. Under that regulation, the cost method in use by any foundry on Feb. 1, 1942, is frozen, and if it was unsound, its faults are frozen with it. Sound job costs are also an important factor in obtaining relief, if this should become necessary. It would pay every foundryman, Mr. Carter stated, to have his cost accounting practice checked, and if it were found to be seriously out of line, it might be advisable to apply to OPA for permission to use a revised pricing formula to determine maximum prices.

The dinner marked the return of Mr. Carter, for many years secretary of the New Jersey Foundrymen's Association, to Newark, after 13 months in Washington as consultant to OPA on the gray iron foundry industry. An unusually large number were present to welcome him. A. E. Winstead, Moore Bros. Co., Elizabeth, N. J., president of the association, presided.

Outlining the new cost program of the Gray Iron Founders' Society, Mr. Carter said it consisted of making advice on cost accounting conveniently available at moderate cost to all gray iron foundries, and of promoting the use of sound cost methods by all members of the industry. The promotion program will include the distribution of information on the need for establishing reliable costs, holding of local cost meetings, appointment of local cost committees, etc.

The two most important needs, the speaker asserted, are to get those who have no cost system to use a simple cost formula, and to get those who use faulty methods to improve them.

The New Jersey Foundrymen's Association went on record as endorsing the cost program and offered its full cooperation to promote it.—*B. K. Price.*

New England

CUPOLA operations during wartime was the topic discussed at the regular meeting of the New England Foundrymen's Association held at the Engineer's Club, Boston, April 14. Donald J. Reese, chief, Iron and Steel Manufactures Section, Steel Division, WPB, was the speaker.

Mr. Reese, an authority on cupola operations, brought out many interesting and instructive points. He explained that although the usual product of a cupola is cast iron, other materials are melted by that process. The product now turned out by cupola melting must be one to meet specifications called for, and at the same time be of constant quality at reduced costs.

A characteristic of the cupola is to try to saturate the metal melted with carbon, and the amount of carbon pickup is influenced by temperature in the furnace, time, chemistry or analysis of the iron present, amount of excess carbon present, and physical nature of the charge, such as amount of pig iron, etc. Therefore, to control the resulting total carbon, skillful handling of the melting process is necessary. Carbon is more important than any other element in cupola metallurgy, and to operate properly is to learn how to harness the carbon pickup tendency.

The ideal operator would weigh accurately all material going into the cupola and, in the experience of the speaker, that point has not been carefully adhered to in many foundries. He would also use care in selecting his materials so that they would be properly sized for the size and capacity of the cupola. The ideal operator would also determine accurately the correct amount of coke for the bed and intermediate coke charges of the furnace, and see that the weights were accurate at all times. The height of bed above the tuyeres can be determined by multiplying the square root of the air pressure by 10.5 and adding 3 to the product. The intermediate coke charge should be 7½ pounds of coke per square foot of cupola area. Mr. Reese illustrated his

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points from time to time by a series of excellent slides. After he had concluded, many participated in the discussion period.

President A. W. Calder, New England Butt Co., Providence, R. I., called attention to the honor accorded R. F. Harrington, Hunt-Spiller Mfg. Corp., Boston, in his being selected to receive the John A. Penton Gold Medal at the annual convention of the American Foundrymen's Association.

A testimonial dinner in honor of E. H. Ballard, general superintendent and pattern shop superintendent, Everett and Lynn plants, General Electric Co., for his 50 years of service to the foundry industry, featured the May 12 meeting of the New England Foundrymen's Association.

After dinner, President Augustus W. Calder, New England Butt Co., Providence, R. I., called upon A. B. Root, Hunt-Spiller Mfg. Corp., Boston, who, in a few well chosen words, presented to the members a brief resume of Mr. Ballard's work and contributions to the foundry industry. He then introduced Mr. Ballard who responded in a most pleasing manner to the bouquet of 50 roses presented to him by the association. Mr. Root also introduced Mr. Salmonsen, assistant manager of the River works, General Electric Co., who paid a fine tribute to Mr. Ballard's achievements during the past 50 years.

Mr. Ballard was born in Hartford, Conn., in 1875. At that time his father was connected with the former Thompson-Houston Electric Co., and moved his family to Lynn, Mass., in 1883 when that plant changed its location. As a boy, Mr. Ballard spent his summer vacations working in various departments of the plant, and in 1894 took a position as clerk in the steel foundry department which had just been organized. While there, he supplemented his earlier education with night school and correspondence school courses.

In 1905, Mr. Ballard became superintendent of the Massachusetts Steel Casting Co., Everett, a firm later absorbed by the General Electric Co., and he has been associated with that concern ever since. The General Electric Co. became a member of the New England Foundrymen's Association in 1896 and Mr. Ballard, after serving on the executive committee, became vice president and president of the association in 1922. Since that time he has served on many important committees, contributing greatly to the advancement and interests of the foundry industry in New England. He also served on the executive board of the American Foundrymen's Association, and in 1931 and 1932 was vice president and president.

Mr. Calder then introduced the guest speaker of the evening, N. J. Dunbeck, vice president, Eastern Clay Products Inc., Eifort, O., who discussed "How To Change the Properties of Sand". Mr. Dunbeck described the terms green strength, dry strength, hot strength, permeability and deformation as applied to molding sands, and explained how those properties were affected by moisture, ramming, auxiliary binders, skin drying and variation in types and amounts of clay bond.—*Merton A. Hosmer.*

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Northeastern Ohio

NEARLY 300 members and guests of the Northeastern Ohio Chapter of the A.F.A. were present at its annual "Old Timers" night. More than 30 men who had served in the foundry industry for 40 years or more were guests of the chapter as well as some 20 apprentices who had submitted castings and patterns in the national apprentice contest held at St. Louis in April. Prizes won by those in the local contest were presented in behalf of the Associated Industries by J. J. Witenhafer, Lake City Malleable Co.; Walter Seebeck, Western Pattern Co., and James G. Goldie, Cleveland Trade School.

John H. Tressler, retiring president of the chapter, announced that since no further nominations had been received, the secretary be instructed to cast unanimous ballot for officers and directors named by the nominating committee. Those include James G. Goldie, president; Russell F. Lincoln, Osborn Mfg. Co., vice president; F. R. Fleig, Smith Facing & Supply Co., treasurer, and J. M. Lathrop, THE FOUNDRY, secretary. Di-

rectors for the 3-year term are J. B. Heisler, A. C. Williams Co., Ravenna, O.; H. C. Gollmar, Elyria Foundry Co., Elyria, O.; Bruce Aiken, Crucible Casting Co.; H. F. Roberts, Williams & Co., and Henry Trenkamp, Ohio Foundry Co. Director for a 1-year term is G. B. Carson, Case School of Applied Science.

Following the various announcements, the members and guests relaxed to enjoy a floor show for an hour and a half, and all those present agreed that the officers and committees of the chapter should be congratulated for their efforts in providing such a fitting climax to a successful season.—*Edwin Bremer, publicity chairman.*

Northern California

APRIL meeting date of the Northern California Chapter of the A.F.A. was delayed in order to take advantage of the invitation extended by Joshua Hendy Iron Works to visit its plant at Sunnyvale, Calif. A prearranged plan of pooling the services of 63 cars made it possible for 225 members and business friends to arrive on time, be registered and tagged according to strict regulations, and be seated in one corner of the company's large cafeteria. Company officials and supervising personnel who conducted the group through the plant brought the dinner party up to 304. The company's personnel presented a musical program during the dinner.

Charles E. Moore, president of the company, in welcoming the visitors, stated that if any one in the group wanted help in solving his war production problems, and the Hendy company had the answer, the company would be happy to give any assistance possible. M. C. Gunetti, plant manager, John B. Bubb, foundry division manager, A. R. Linn, manager of industrial relations and officers of the chapter were seated at Mr. Moore's table. F. A. Mainzer, president of the chapter, responded to Mr. Moore's welcome, expressing the group's appreciation of the special privilege of making the visit.

With the exception of the foundry, most other units were working night crews. Interesting and spectacular were the immense engine and turbine shops built on land recently covered with fruit trees. Visitors were high in praise for the effort put forth by the Hendy company to win the war.—*George L. Kennard,*

Obtains Patent on Cast Steel Shell

A cast steel shell, claimed to be superior to forged or drawn shells, has been patented by Donald J. Campbell, president, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich. Samples have been prepared and discussions have been held with the War Department regarding the possibility of using the shell. The missile is produced in a multiple chilled mold.

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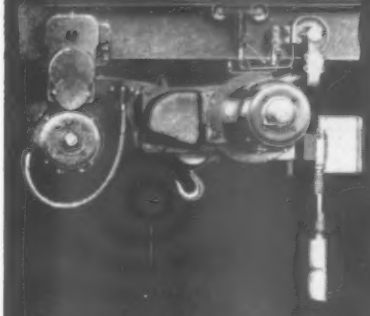

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A·F·A
Picks Officers, Directors

LEE C. WILSON, Reading Steel Casting Division, American Chain & Cable Co. Inc., Reading, Pa., was elected president of the American Foundrymen's Association, and Ralph J. Teetor, Cadillac Malleable Iron Co., Cadillac, Mich., was made vice president, at the annual business meeting held during the recent St. Louis convention. In addition, five new members were elected to the board of directors.

Directors, all named to serve a three-year term, are: Max Kuniansky, general manager, Lynchburg Foundry Co., Lynchburg, Va.; Roy M. Jacobs, president, Standard Brass Works, Milwaukee; Harry Reitinger, resident manager, United States Pipe & Foundry Co., Burlington, N. J.; William B. Wallis, president, Pittsburgh Lectromelt Furnace Co., Pittsburgh; and Duncan P. Forbes, president, Gunite Foundries Corp., Rockford, Ill.

Lee C. Wilson

LEE C. WILSON, general manager, Reading Steel Casting Division, American Chain & Cable Co. Inc., Reading, Pa., received his preparatory education in the schools of New Haven, Conn., and his technical training at Sheffield Scientific School of Yale University, being graduated from the latter in 1907 with a degree in mechanical engineering. Entering the sales department of Harbison-Walker Refractories Co., he represented that company for a number of years in its Pittsburgh, Chicago, New York and New England districts. Subsequently Mr. Wilson joined Chain Belt Co., Milwaukee, as assistant to the vice president, later being made general sales manager. Transferring to Federal Malleable Co., Milwaukee, as secretary, he was later elected vice president and general manager, which position he relinquished to accept his present affiliation with Reading Steel Casting Division. Mr. Wilson was vice president of the A.F.A. the past year, a director for three years (1926-1928) and for many years has been a member of the Steel Division Advisory committee, chairman of the division's committee on impact testing and chairman of various convention sessions. He is A.F.A. representative on A.S.T.M. Committee E-1 on Methods of Testing.

Ralph J. Teetor

RALPH J. TEETOR, president, Cadillac Malleable Iron Co., Cadillac, Mich., was graduated from Purdue University with a degree in mechanical engineering in 1905, at which time he became associated with Link-Belt Co., Indianapolis. He resigned as chief engineer of that company in 1915 to become secretary of Standard Malleable Iron Co., Muskegon, Mich. During the last war, Mr. Teetor served as major of infantry until December, 1918, and as division inspector until 1919 when he was discharged from the Army. He then became vice president and general manager of Howe Chain Co., Muskegon, Mich., remaining there until 1921 when he became interested in the iron and lumber business in Cadillac, Mich. His interests in that locality led him to establish the Cadillac Malleable Iron Co. where he became secretary and general manager, taking an active part in the erection and operation of the plant. Later, he was elected to the presidency. Mr. Teetor has been a member of the advisory group and other committees of the malleable division of the A.F.A. and has presented several papers before annual meetings. He served as director of the association for three years (1933-1935).

Max Kuniansky

MAX KUNIANSKY, general manager, Lynchburg, Foundry Co., Lynchburg, Va., was born in Russia and came to this country at an early age. He received his technical education at Georgia School of Technology, graduating in 1919 with a

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bachelor of science degree in engineering chemistry. Following graduation he was connected with the Aetna Explosives Co., now Hercules Powder Co., at its plants in Birmingham, Ala., and Ishpeming, Mich. He served for a time with the National Malleable & Steel Castings Co. at its Chicago plant and with the American Cast Iron Pipe Co., Birmingham. Mr. Kuniansky became associated with the Lynchburg Foundry Co. in 1923 as chief chemist, retaining that position until 1928 when he was made works manager. Later he was appointed general manager of the company with headquarters at Lynchburg and manager of both the company's Lynchburg and Radford, Va., plants. Mr. Kuniansky has been an active member of the A.F.A., serving on a number of its technical committees, and as a member of the board of directors of the Chesapeake Chapter of the A.F.A. In 1941 his contributions to the association and the foundry industry were recognized by the award of the William H. McFadden gold medal of the association. In addition to his activities in the American Foundrymen's Association, Mr. Kuniansky has taken an active interest in other technical and professional associations, particularly the American Society for Testing Materials.

Roy M. Jacobs

ROY M. JACOBS, president, Standard Brass Works, Milwaukee, has been connected with the foundry industry since he was 15 years old. While attending school he worked after school, Saturdays and during vacations at the Standard Brass Works. With the exception of about 6 months during 1912, when he was a commissary clerk on a railroad crew, Mr. Jacobs has been connected with the Standard Brass company. He began full-time work with that company in November, 1912, and was elected president in September, 1925. Mr. Jacobs was an active participant in the formation of the Wisconsin Chapter of the A.F.A. and served as its president in 1938-39.

Harry Reitinger

HARRY REITINGER, resident manager, United States Pipe & Foundry Co., Burlington, N. J., a native of Philadelphia, was educated in the schools of that city. He served as consulting engineer on distilling plant projects and for several years was a member of the staff of Emerson Efficiency Engineers, New York. While with that company, he acted as consultant for the government as civil engineer in the installation of distilling plants of various fortifications and during the first World war was retained by the government in the manufacture of munitions, serving both the United States and Canada. Mr. Reitinger returned to the Emerson organization following the war and remained with that concern until 1922 when he became associated with the United States Pipe & Foundry Co. Mr. Reitinger is a past chairman of the Philadelphia Chapter of the A.F.A., and has been active in the work of that group.

William B. Wallis

WILLIAM B. WALLIS, president, Pittsburgh Lectromelt Furnace Co., Pittsburgh, was born and educated in Pittsburgh and was graduated from Pennsylvania State College in 1911. Following graduation he became connected with the consulting engineer on the Cheat River Hydroelectric Development for the West Penn Power Co., Pittsburgh, later becoming connected with the Great Shoshone and Twin Falls Water Power Co., Twin Falls, Idaho. For a short time he served as assistant to the vice president in charge of operations for that company in Pittsburgh, and in 1913 became assistant sales manager, West Penn Power Co., Pittsburgh. He resigned in 1915 to return to the consulting field with W. E. Moore & Co., where he remained until 1917 when he became assistant general manager, Jessop Steel Co., Washington, Pa. He resigned that position to become associated with his present company. Mr. Wallis has been active in the affairs of the American Foundrymen's Association, and serves on numerous of its committees. He is an acknowledged authority on the use of electric furnaces in the foundry industry.

Duncan P. Forbes

DUNCAN P. FORBES, president, and general manager, Gunite Foundries Corp.,

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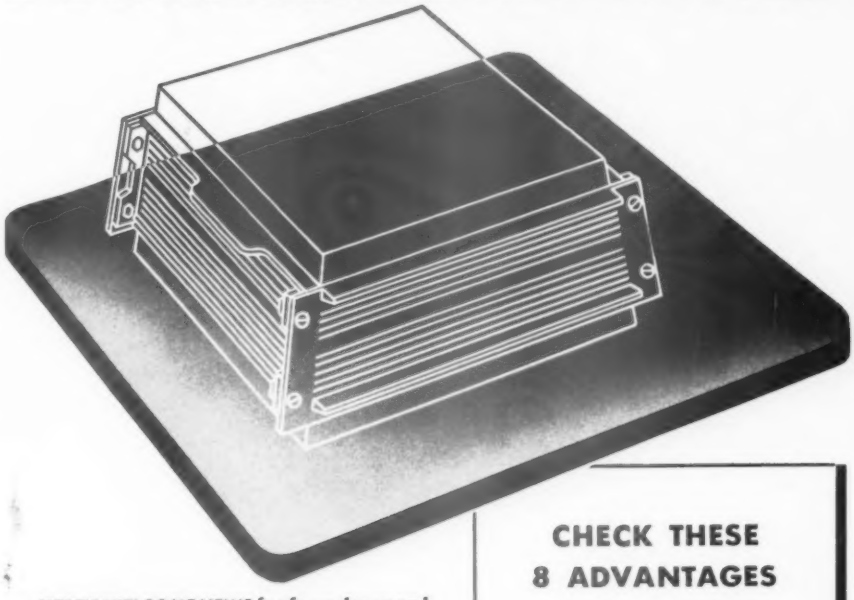

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FOUNDRITE Bottom Boards

Rockford, Ill., and retiring president of the American Foundrymen's Association, comes from a long line of foundrymen. His great grandfather Duncan Forbes was a pioneer in the production of malleable iron in America and established the company of which Mr. Forbes now is president. Mr. Forbes was graduated from Yale University in 1919 and took post graduate work the following year specializing in metallurgy. Later he spent some time in the laboratory of Enrique Touceda at Albany, N. Y. He entered the employ of the Rockford Malleable Iron Works in 1921 serving first as a molder, then was appointed junior metallurgist and later became molder foreman. He was appointed works manager in 1925. As a result of research work under his direction, a process was developed to produce high test gray iron using the air furnace as a melting medium. The metal was given the tradename of Gunite and a separate corporation was organized in 1928 to manufacture and sell the metal. Mr. Forbes was elected president of the Rockford Northwestern Malleable Corp. which became the Gunite Foundries Corp. in 1932. Mr. Forbes has been active in the work of the American Foundrymen's Association, particularly in the malleable division of which he has been a member since its organization in 1932. He is a member of the technical activities correlation committee and the gray iron subcommittee on specific applications, as well as being a member of several other committees as well. He has presented papers and talks before both national and chapter meetings, and was one of the sponsors of the Northern Illinois-Southern Wisconsin Chapter, and has served on its board of directors.

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Aluminum Casting Patents Expire

Aluminum Co. of America, Pittsburgh, has announced the expiration of two of its patents, namely U. S. Patents Nos. 1,508,556 and 1,572,487, covering heat treatment of aluminum alloy castings. The patents involved are particularly important to the aircraft industry in connection with the casting of high strength structural parts, structural fittings, crank cases, cylinder heads, and small engine parts.

Two types of castings are involved. One is an aluminum base alloy casting containing silicon; the other an aluminum base alloy casting containing between 3 and 5.5 per cent copper. In both cases, a solution heat treatment is used, with or without a subsequent aging treatment.

Procedure involves heating the castings to a temperature just under the melting point of the metal (from 950 to 1000 degrees Fahr. depending on the alloy) and holding the casting at that temperature for a sufficient length of time to permit the soluble constituents of the alloy to go into solid solution. The casting then is quenched, usually in water, and artificially aged at an intermediate temperature (around 310 degrees Fahr).

Licenses under a number of unexpired patents of Aluminum Co. of America relating to the heat treatment of aluminum base alloy castings are available through sales offices of the company. Such licenses are royalty free for the duration of the war. Complete information regarding heat treatments covered by the expired patents is at the disposal of interested parties, and booklets containing detailed data pertaining to the various methods of heat treatment involved are available to all licensees.

Make War Castings At Exhibit Plant

Iron foundry at the Museum of Science and Industry, Chicago, recently started commercial operations. Originally designed only for exhibit purposes, the foundry now operates every day, except Monday and Tuesday, producing small war castings at the rate of several hundred pounds a day. In addition, practical experience as foundrymen is being provided students from the Washburn Trade School on a rotation basis.

This war project has been undertaken by the Museum in co-operation with the Chicago Chapter of the A.F.A.

CITED FOR WAR PRODUCTION

American Machine & Metals Inc., East Moline, Ill., has received the six-months' production star to add to the "E" flag won by the company last September. DeBothezat Ventilating Equipment Division is one of the divisions of American Machine & Metals Inc. participating in the award.

° ° °

Ampco Metal Inc., Milwaukee, has been advised by Robert P. Patterson, under secretary of war, that it has won the Army-Navy "E" award for production of war material. Presentation of the award was made at the plant May 16.

° ° °

Defiance Machine Works Inc., Defiance, O., received the Army-Navy "E" at ceremonies held at the plant May 11. Maj. R. H. Coburn presented the "E" pennant to D. W. Champlin, vice president and general manager, and Fred Houck, machinist with 53 years' service. Comm. F. J. McManamon presented "E" pins to the workers. The Defiance company recently won the Chafee Trophy of the National Machine Tool Builders Association for the highest percentage increase in tools delivered in the fourth quarter of 1942.

° ° °

Fort Pitt Steel Casting Co., McKeesport, Pa., recently was presented the Maritime "M" and Victory Fleet flag by Col. Willard F. Rockwell in charge of production for the Maritime Commission. The award was accepted in behalf of the company by Fred Grotts, president.

° ° °

Hammond Brass Works received the Army-Navy "E" award April 27 at ceremonies at its newly enlarged plant at Hammond, Ind. Samuel Greenwald, president of the company, accepted the award, presentation of which was made by Col. Martin H. Ray, representing the Army, and Capt. H. L. Pence of the Navy.

° ° °

William F. Jobbins Inc., Aurora, Ill., aluminum refiner, received award of the Army-Navy "E" for excellence in production of war materials in ceremonies at its plant, April 29. Lieut. Col. W. S. Kay, judge advocate general branch, Sixth Service Command, Chicago, made the presentation, which was accepted by F. Hedley Jobbins, company president.

° ° °

Manning, Maxwell & Moore Inc. was the recipient of two Army-Navy "E" awards April 19 and 20. On April 19 the pennant was presented to the Bridgeport, Conn., plant by Admiral Thomas C. Hart, U. S. N. (Ret.). The Boston plant received the award the following day from Rear Admiral Wat T. Cluverius, U. S. N. (Ret.). Both awards were accepted by C. A. Moore, chairman of the board of the company.

° ° °

Union Metal Mfg. Co., Canton, O., received the Army-Navy "E" at ceremonies held April 9 and attended by over 1500 employes, their families and friends. The award was made to C. A. Orr, company president, and Elmer G. Baird, employe representative, by Maj. Ralph H. Coburn.

Apprentice Training Pamphlet Issued

A pamphlet entitled "Training Apprentices for War and Post-War Work" has been published by the Apprentice-Training Service, War Manpower Commission, Washington. It stresses the importance of all-round training in skilled trades, and describes the results of a plant apprenticeship system which has been in operation since 1934, and how this system is conducted. It was written by the apprenticeship director of a large manufacturing company. Copies may be obtained from WMC regional offices or from the Washington office, 1778 Pennsylvania Avenue.

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THE TANNEWITZ WORKS, GRAND RAPIDS, MICHIGAN

WASHINGTON NOTES ★ ★ ★ ★

CONTROLLED Materials Plan will become fully effective July 1, as originally scheduled. Continued need for effective distribution of critical materials is reflected in the fact WPB was forced to scale down third quarter requests of various government agencies for steel, copper and aluminum by 23 per cent in order to match supply. Requests for carbon steel alone were 5,000,000 tons in excess of estimated production, and prospects for an early easing in pig iron supplies grow no brighter.

° ° °

While copper is a controlled material, brass foundries are reminded that it is unnecessary for them to file any CMP form for copper or copper base alloy material. Application should be made to the Copper Division of WPB on Form PD-59F. However, such companies which also operate a machine shop must file CMP-4A or CMP-4B to receive copper and copper base alloy castings either from their own foundry or from an outside supplier.

° ° °

ALUMINUM foundries are required to file a new form, CMP-24, by the 10th of each month to report shipments of castings for the preceding month. This form is required in addition to CMP-19 which details operations, inventory and orders of foundries, and the first report is due at Washington by June 10. CMP-24 also must be filed by producers of aluminum in practically all other forms except ingots. Primary and secondary ingot producers report monthly shipments and unfilled orders on CMP-23. Introduction of form CMP-24 permits abandonment of 12 older forms, including PD-26A.

■ **ALUMINUM PATTERNS: Method of obtaining aluminum pattern or matchplate castings described in the May issue of THE FOUNDRY, p. 166, should be disregarded. It has been superseded and simplified by a revised procedure, issued May 13 under Direction 1 to CMP Regulation 5. As before, no rating, symbol or certification is required of the pattern buyer if he turns in an equal amount by weight of obsolete or defective aluminum patterns. However, the new procedure also permits him to obtain patterns in an amount not exceeding 600 pounds per quarter (plus poundage turned in for remelt) merely by affixing to his order the symbol "MRO" and the certification prescribed by CMP Regulation 7.**

If the buyer's quarterly requirements exceed 600 pounds plus remelt poundage furnished, purchase of the excess may be authorized upon application by letter to the Aluminum and Magnesium Division, WPB, Washington, Ref: Patterns, giving details on requirements and scrap patterns available.

Upon receipt of a properly certified order, the foundry or pattern shop may purchase aluminum pattern or matchplate castings by using the No. 7 certification and rating and symbol furnished by the pattern buyer. This should not be the MRO rating of the foundry or pattern shop, but must be the one furnished by the customer for whom the pattern is to be made. It will be noted that the new procedure eliminates the necessity for every pattern manufacturer to apply for his allotment of aluminum —a requirement under the superseded method.

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DETROIT ELECTRIC FURNACE DIVISION
KUHLMAN ELECTRIC COMPANY • BAY CITY MICHIGAN

OPA says it hopes to continue to reduce the number of reports and questionnaires required of industry, pointing out that it now has collected considerable price and cost data and will not need as much information of this sort as it did when price regulations first were being drawn. The first four months this year, OPA eliminated 70 out of 460 reports, although most manufacturers are unable to detect an easing in the load of paper work.

° ° °

PIPE fittings made of gray cast iron, malleable iron, brass and bronze now are regulated under Limitation Order L-288. The order establishes sizes and standards of fittings permitted to be produced or sold. Fittings formerly were covered by Schedule II of Order L-42. This schedule has been revoked, and its provisions are incorporated without modification in L-288.

° ° °

Procurement Division of the Treasury Department has approved revised specifications covering bronze castings, these specifications being for use of all departments and establishments of the government. Effective May 1, they include QQ-B-691a, Amendment 2, (bronze castings), replacing one dated Sept. 30, 1942, and QQ-B-726b, Amendment 1, (manganese bronze castings, including manganese-aluminum bronze) replacing one dated Nov. 3, 1942.

° ° °

SEVERAL Army-Navy "E" awards have been withdrawn from plants because of preventable slowdown in production or quality of work, unjustifiable absenteeism or work stoppages. The award board, wanting to prevent workers and management from assuming that an "E" is an excuse for letting down on the job, reviews the record of recipients every six months to determine whether the award shall be renewed or withdrawn.

° ° °

WPB has denied that it is proceeding upon a nationwide plan for concentration of industry. The subject has received considerable study, but the conclusion has been reached that no formula or general plan for concentration of a great number of industries is possible, because each industry poses a particular problem. If WPB acts on the experience of Great Britain in attempting to concentrate iron foundries (see the May issue of THE FOUNDRY, *page* 101) *there will be no attempt to consolidate production of gray iron castings.*

° ° °

LATEST report by WPB on the supply-demand status of important materials reveals little change in the ferrous group. Of the nonferrous metals, bismuth, cadmium and tin have become relatively more tight. Softwood box lumbers have been affected by increased demands for overseas shipping containers, while treated papers also are becoming more critical. Hides now are among the most critical of the textiles and fibers in the group for which supplies are insufficient either for war demands alone or for war

■ **FOUNDRY EQUIPMENT: Controls over production and sale of foundry equipment, established by WPB in Order E-11, provide that on and after June 1 sales and deliveries shall be limited to orders rated AA-4 or higher. Equipment covered includes blast cleaning equipment, core-making and crushing machinery, cupolas, dust collectors, flasks, ladles, metal molding machines, core and mold ovens, sand preparing equipment, shakeout equipment and tumbling barrels or mills.**

Electric metal melting furnaces having a kilowatt input of 50 or over, except laboratory units, are affected similarly by the same order. Equipment having a retail sales price of less than $200 is exempted from the order. Repair parts likewise are not affected. Ratings assigned on Forms PD-25A or PD-25F, or by CMP Regulations No. 5 or 5A may not be used to purchase foundry equipment or electric melting furnaces.

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plus essential civilian demands.

° ° °

Lumber shortage has grown progressively worse the past few months and has spread to nearly all commercial species. OPA has ruled that buyers of lumber, lumber products and wooden containers cannot forego cash discounts in order to improve their competitive buying position.

° ° °

MAXIMUM prices of high alloy castings under MPR No. 214 generally are on a freight allowed basis, consequently producers must absorb the 3 per cent transportation tax which became effective last Dec. 1. However, OPA has cited two circumstances which are exceptions to this provision: If the shipment totals less than 100 pounds, the seller may add the tax; if the buyer specifies means of transportation costing more than the lowest applicable railroad rates, the tax on the excess may be added.

° ° °

Another OPA interpretation with reference to the transportation tax applies to shipments of manganese steel castings. This ruling provides that where maximum prices are established on a freight equalization basis, the seller may add only 3 per cent of the freight rate from the equalization point to destination. The 3 per cent on whatever freight is equalized must be allowed by the seller in ascertaining his maximum prices.

° ° °

LIVING costs in the United States in 1943 have been rising at a rate almost as great as in 1942, and our record in this respect compares unfavorably with those of Great Britain and Canada. British costs have been almost stationary since May, 1941, although they shot up rapidly the first 6 months of the war and more gradually the following year. During 1942, the Canadian index advanced only about 2½ per cent, against 9 per cent in the United States. The Canadian rise of 10 per cent in 1941 and 1942 compares with 20 per cent here. The fact American war expenditures have far exceeded those of the other countries has made price control more difficult.

° ° °

Relaxation of restrictions on production or sale of various civilian goods has occurred rather frequently so far this year, although WPB points out that these exceptions are intended only to protect the civilian economy and do not represent an easiness in critical material supplies. Products affected by such actions include pressure canners, alarm clocks, ice boxes, mechanical refrigerators, can openers, farm machinery, commercial dishwashers, water line extensions, coal furnaces, metal lids for glass containers, metal windows and lath, and farm wire products.

° ° °

TOOLS Division of WPB is calling attention to an unlawful practice by some users of gages and precision hand tools. Such plants have been issuing "blanket" purchase orders to gage and tool distributors, with instructions that the tools be held in the distributor's stock for exclusive sale to the particular contractor's employes. This is a violation of Priorities Regulation No. 3 and Order E-5-a, and distributors holding stocks of precision tools so earmarked for a specific contractor's employes have been advised they must make these tools available to any approved user or employer in accordance with terms of Order E-5-a.

° ° °

War plants are being urged by the WPB Conservation Division to make greater use of reconditioned hand files. Leading industrial plants are said to have indicated that resharpening adds about 60 per cent to the original life of the file, and the cost of reprocessing is only one-half to one-third the cost of a new file. Deliveries of reprocessed files were generally reported to be more prompt than deliveries of new files.

° ° °

SHORTAGE of industrial oxygen will continue until early 1944, when it is expected that new plant facilities will be

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"EVERY DROP WORKS"

FREE SAMPLE

Write on your business letterhead for a free trial sample of Franklin Liquid Hide Glue. No obligation.

completed. Tightness in calcium carbide supplies also is not expected to be relieved until next year, although several new production facilities are scheduled for completion the next few months.

° ° °

In contrast to the situation in oxygen and acetylene, production of shielded arc electrodes—far below essential requirements the past year and a half—is increasing steadily and is now slightly in excess of current consumption, according to the General Industrial Equipment Division, WPB.

° ° °

REGULATIONS affecting production and sale of certain light power-driven tools (L-237) have been modified. While purchases of such tools on ratings assigned by CMP Regulation No. 5 (MRO) are not permitted, this prohibition now does not apply to deliveries having a producer's list price on Oct. 15, 1942 of $175 or less. The maximum exemption previously was $35. The amendment also exempts orders placed before May 3 and rated pursuant to Regulation No. 5. Woodworking tools are removed from the order, now being covered largely by Order L-83.

° ° °

Production and delivery of portable conveyors, regulated since May 3 by Order L-287, are limited to orders rated A-5 or higher if placed after May 9 or to orders rated A-1-c or higher if placed before May 10. Conveyors or parts made or delivered after June 8 must conform to specifications and restrictions on the use of materials as incorporated in the order, although this provision is inapplicable to maintenance or repair parts not exceeding $300 for a single conveyor or to conveyors or parts manufactured before May 10 to a point where other use of the particular item is impracticable.

° ° °

MANUFACTURERS of hand trucks and related material-handling equipment now are permitted to use ball bearings, if made of other than alloy steel, in swivel bearings or casters. They may also use rerolled rail steel as well as bessemer grades where formerly only bessemer was permitted. These provisions are incorporated in an amendment of Order L-111.

° ° °

Use of cast iron soil pipe and fittings for sanitary drains in and under buildings should be continued as long as the supply of raw materials from which these products are manufactured is adequate, the Plumbing and Heating Division of WPB has recommended.

° ° °

ABOUT 60 per cent of the cost of government-financed industrial plant expansion this year will represent machinery and equipment, compared with 45 per cent last year. Estimated distribution of 4.5 billion dollars in 1943 for this purpose will be split 2.7 for machinery and equipment, 1.8 for construction. Last year the division was 2.89 for the machines, 3.6 for the buildings.

° ° °

Contract renegotiations, refunds and other recoveries returned 2.5 billion dollars to the government between April 28, 1942, and last March 31. Many contracts signed so far this year show substantial cuts in unit prices from those of a year ago. A few examples follow: 75 mm. tank guns, $2150 from $3000; 20 mm. AA cannon, $840 from $1280; 105 mm. shells, $19 from $24.50; bomber airframe, $160,000 from $235,000; 50 calibre machine gun, $450 from $640; anchor windlass, $4800 from $6230.

° ° °

A ONE-MAN home front recently was discovered by a Wisconsin draft board. Johnny Pucek, 24, gets up at 5 a.m., milks 22 cows, drives 20 miles to a foundry 6 days a week and works as a molder, comes home at night to milk the cows again and work in the fields with a headlight-equipped tractor until 10 or 11 p.m. When Johnny asked his draft board to induct him the board ruled he was more useful at home.

W. G. G.

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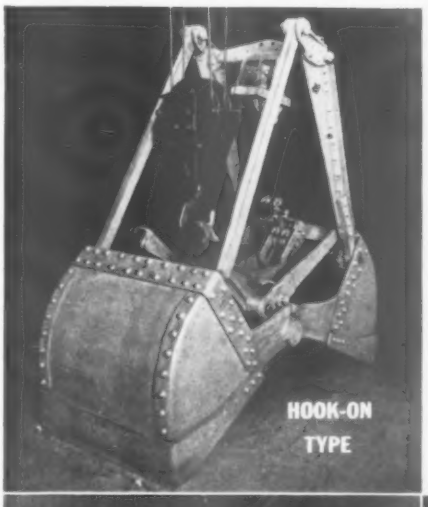

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FOUNDRY DEVELOPMENTS
At short range

RELATION of depth of bath to diameter in the direct arc melting furnace should be about 1 to 5 or 6 according to one expert. Hence, a bath 1 foot in depth will be not more than 5 or 6 feet in diameter. While that ratio has not been determined through laboratory experiments, it has been found to function satisfactorily under some operating conditions. With too large a shell and low volume of metal, the bath is spread over too large an area which results in difficulty. Conversely, if the bath is too deep for the diameter of furnace, proper refining hardly can be expected.

♦ ♦ ♦

One jobbing foundry employs a simple, but effective means to indicate to the molder the number of castings required from a pattern, according to Miss F. Meier of Newark, N. J. It consists in sticking a small piece of adhesive tape on the pattern, and marking in red or black the number of castings. The tape is removed readily after the job is finished, and eliminates the necessity of any other type of marking.

♦ ♦ ♦

A malleable foundry using the cupola-electric furnace duplexing process bases blast requirements for the cupola on the following considerations: That the difference in carbon content of the material charged in what comes over the spout must be picked up from the coke. The coke contains a given amount of fixed carbon. That all of the carbon charged into the cupola either enters the iron or goes out the stack as CO_2 or CO. All of the carbon charged in does not necessarily get to the tuyeres due to the secondary reaction: $CO_2 + C = 2\,CO$. The amount of carbon that does reach the melting zone and to which air must be supplied is the difference between what is absorbed in the iron plus the amount lost out the stack as CO, deducted from the total carbon charged.

♦ ♦ ♦

A rather unusual procedure to determine the gas content of rich brass, nickel brass or nickel silver containing under 17 per cent zinc is described in a recent patent. A small amount of the molten metal is poured into a crucible located in a vacuum chamber. The metal is allowed to cool until a thin crust is formed over the top and then the vacuum pump is started. Contained gases in the molten metal under the crust seeking egress raise the crust a measurable distance which indicates the amount of gas present, and the quantity of degasifier which must be added to counteract or eliminate the gases.

♦ ♦ ♦

CHOICE of a molding sand for aluminum alloy castings should be made with attention both to casting surface requirements and the factor of gas porosity. Choice generally will fall within the following specifications when the sand is

For MORE SPEED
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A Tough WHEEL
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Many of America's most progressive steel and gray iron foundries find Dayton Correctly Bonded Grinding Wheels give their cleaning departments a new standard of efficiency.
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tempered with 5 to 7 per cent moisture: Grain class A.F.A. 1 or 2; grain fineness number 140 to 270; clay class E, F or G; clay content 10 to 25 per cent; compressive strength 5 to 8 pounds per square inch, and permeability 5 to 30.

♦ ♦ ♦

For extinguishing magnesium fires a recent patent recommends the use of aromatic tri esters of phosphoric acid. Compounds suggested are liquid di (ortho-xenyl) mono-phenyl phosphate with or without addition of ground graphite, and a mixture of tri (para-tertiary butyl-phenyl) phosphate 10 per cent by weight; finely divided graphite 85 per cent by weight, and coal tar pitch (210 degrees Fahr. melting point) 5 per cent by weight.

♦ ♦ ♦

IN PRESENTING the first annual Foundation Lecture at the recent convention of A.F.A. in St. Louis, John W. Bolton took for his subject, "Foundry Metallurgy in the Castings Industry", and near the end of his discourse made remarks which should be given deep consideration, and the condition remedied. They are as follows: "Foundries which conduct research are directly in the minority. Yet all foundries pay for research. In many cases those who pay most dearly are those, who without research, or even good control, have great and hidden losses. Oftentimes wastages and losses are unsuspected. Thorough checkup may reveal surprising things. Riding on the other fellow's developments is far from a safe or conservative business policy."

♦ ♦ ♦

Two young engineers at the Eclipse-Pioneer Division, Bendix Aviation Corp., Bendix, N. J., have developed an electrochemical procedure for removing broken drills and taps from aluminum alloy castings so that it no longer is necessary to scrap the latter. The apparatus consists of a funnel-like device housing a copper tube which is placed over the broken drill or tap. An electrochemical reaction is set up which disintegrates the broken tool leaving the casting intact.

♦ ♦ ♦

Addition of sodium silicofluoride in the amount of 5 pounds per ton to gray cast iron is advocated in a patent as a means of removing oxides and other foreign inclusions. It is claimed that the iron is more free from blow holes and spongy sections; cleaner and closer grained, and stronger and tougher.

♦ ♦ ♦

A method for centrifugally degasifying molten metal described in a patent involves a spiral trough rotating in a horizontal plane and a heated basin or holding hearth. Molten metal is poured in the center of the rotating trough and follows the spiral to the outer edge where it drops into a collector, and thence into the heated basin from which it is poured. While designed for steel for ingots presumably it could be applied to other cast metals and alloys.

E. B.

Compressed Air Jet Induces Draft

According to the Compressed Air Institute, New York, one firm corrected a fume nuisance in a heat treating furnace through use of a compressed air jet. The firm makes small metal parts that must be hardened. Heating is accomplished in an electric furnace. A few minutes after the oil covered parts are placed in the furnace, the oil begins to bake and produce fumes which are not carried off properly by the cold offtake flue. However, a blast of air with a pressure of approximately 60 pounds per square inch injected into the flue for less than 5 minutes carries off the fumes until the normal draft from the heated furnace begins to function. It is claimed that installation is simple and effective.

Zinc Plating Report

Turco Products Inc., Los Angeles and Chicago, has prepared a 14-page technical report on bright zinc plating as a substitute for cadmium plating. The mimeographed report gives descriptions of still and barrel plating, using a choice of three pre-cleaners manufactured by the Turco company. The report is available upon request.

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• Mexite Briquettes are a convenient and uniform source of carbon in the cupola charge; easily added and give consistent and positive results.

This dependable manner of adding graphite carbon to your iron improves the metal by assuring you of strict carbon uniformity. Iron treated with Mexite Briquettes in the charge has more "life" and "freshness"; consequently your pouring conditions are improved and you will produce higher quality castings.

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Nonferrous Foundrymen Hold

ORGANIZATIONAL MEETING

GOOD attendance and active interest marked the "National Mobilization Meeting" of the Non-Ferrous Founders' Society held in St. Louis April 28 during the A.F.A. congress. Some 76 executives of 66 nonferrous companies attended the session, which was held partly for the purpose of perfecting the organization of the society as the national trade association of nonferrous jobbing foundries.

A board of 18 directors was elected by the membership. The board, in a meeting held immediately after adjournment, then selected from among its own number an executive committee, which committee in turn selected 1943-44 officers.

These officers are: President, Chester K. Faunt, works manager, Christensen & Olsen Foundry Co., Chicago; vice president, Edwin W. Horlebein, president, Gibson & Kirk Co., Baltimore; secretary-treasurer, R. M. McClure, Chicago and Washington.

Directors consist of the following, the first seven of which also are members of the executive committee: T. H. Addie, American Manganese Bronze Co., Homesburg, Philadelphia; A. M. Cadman, A. W. Cadman Mfg. Co., Pittsburgh; Chester K. Faunt; George B. Hazen, Brass Foundry Co., Peoria, Ill.; Thomas S. Hemenway, Metal & Alloy Specialties, Buffalo; Edwin W. Horlebein; Roy M. Jacobs, Standard Brass Works, Milwaukee.

Harry Burgin, Bridesburg Foundry Co., Philadelphia; Justin A. Duncan, William Duncan Co., East Boston, Mass.; F. J. Eberhardt, Eberhardt & Wagner Co., Chicago; Louis Fischer, Fischer Casting Co., Plainfield, N. J.; James G. Gilbert, Gilbert Brass Foundry Co., St. Louis; W. J. Hunter, Hunter Foundry Co., Chicago; Albert Meskan, Louis Meskan Brass Foundry, Chicago; L. M. Nesselbush, Falcon Bronze Co., Youngstown, O.; William E. Paulson, Thomas Paulson & Sons Inc., Brooklyn; Charles H. Stokesbury, Derby Castings Co. Inc., Seymour, Conn.; Oscar Swangren, Dorchester Brass & Aluminum Foundry, Hyde Park, Mass.

Upon the recommendation of the resolutions committee—A. M. Cadman, T. H. Addie and Oscar Swangren — several slight changes were made in the by-laws after which they were formally adopted. Modifications include a change in the titles of principal officers—to "president" and "vice president" from "chairman" and "vice chairman"; the placing of dues on a graduated scale based on the net sales of nonferrous (rough) castings for the preceding year, and the arranging for the holding of regularly scheduled as well as special meetings of the entire membership as well as of the board of directors and the executive committee.

An important feature of the St. Louis meeting was a detailed report on what had been done by the Washington contacts committee and the acting executive committee in appealing to the Office of Price Administration for modification of Revised Maximum Price Regulation 125, together with discussion of proposals for further action on the matter.

Business as.... UNUSUAL

Wartime selling and servicing sales of ferro-alloys, pig iron, coal, coke, shot and grit, has a different complexion than the peacetime job. However, it is still our business to bring you the best of our judgment on these product applications, based on over a half century of service.

BUSINESS is unusual. Restrictions on travel make it difficult to maintain continuous contacts with our customers. Regulations cause us to operate on a different basis. Part of our staff has been necessarily reduced.

Despite this picture, however, we want you to know we are still very much on the job of watching carefully all details in connection with your orders. We still maintain nine offices, strategically located. We still can bring you the benefit of business knowledge, impartial consideration of your operating problems and a close affiliation with the specific war job you are doing. Call on us any time.

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Absenteeism Control Methods Suggested

A pamphlet detailing experiences of management in dealing with absenteeism in some 200 outstanding war plants has been prepared by the United States Department of Labor. This pamphlet is in response to many requests from war contractors for information and control methods on the subject. Copies may be obtained on request to the Division of Labor Standards, United States Department of Labor, Washington. Another pamphlet, entitled "Ways of Dealing with Absenteeism," and issued by War Production Drive Headquarters, suggests methods for handling situations which contribute to lost time on war jobs. Copies are obtainable from the Office of War Information, Washington.

Molding Sand Practice for MAGNESIUM FOUNDRIES

By CLYDE SANDERS
American Colloid Co.
Chicago

MAGNESIUM castings are in the limelight, due principally to their important use in the airplane industry. The main advantages arising from the use of magnesium alloys result from its low specific gravity of about 1.8 compared with 2.8 for aluminum and about 7.2 for steel. In the rapid growth that has taken place in the past 2 years, many problems arose. One of the most difficult of those has been the selection of a suitable type of molding sand. In the early days it was thought necessary to use dry sand or baked molds, but research and practical experience has solved the problem by the use of a green synthetic sand bonded with bentonite.

Moisture content of magnesium molding sands must be at a minimum. Bentonite can be worked in the average magnesium sand with as low as 2.5 per cent moisture. High moisture encourages burning of the metal due to its oxidizing effect.

Must Be Permeable

Sand grains must be fine enough to provide a velvety finish on the casting and yet open enough to permit escape of gases during pouring. Magnesium metal is so light that back pressure must be removed or blows will develop. A permeability of about 40 is desired in light and medium weight castings, whereas with heavier ones, such as airplane wheels, a sand with a permeability of about 190 is best to eliminate blows. The green compression strength should be from 6 to 10 pounds per square inch depending again on the type and size of the casting.

In some cases, especially when casting large flat surfaces, a small addition of fireclay bond is used with bentonite in the sand to act as a mechanical buffer to offset the expansion of the silica grains on heating, which otherwise might result in buckles or rat-tails. The extra amount of shrinkage of the added fireclay helps to compensate for the expansion of the silica grains when the metal is poured.

The bond must be one that will not be affected unfavorably by the chemical inhibitors which are used in magnesium molding sand. Bentonite is not changed in green strength properties but is affected in a favorable direction in respect to its "hot compression strength". When casting magnesium metals, the sand should be yielding and not highly resistant to compression forces while the metal and mold is hot. In other words "hot compression strength" should be moderate. Western bentonite usually has high hot compression strength but strangely this condition is reversed when inhibitors are used in the sand.

Average amounts of inhibitors customarily used in magnesium synthetic sands are as follows: Sulphur 1.5 per cent; boric acid or borax 1.5 per cent, and ammonium silicofluoride or ammonium borofluoride 0.5 per cent. Other inhibitors have been tried, as naphthalene, resinous oils and volatile hydrocarbons and certain alkaline sulphites. They have not yet reached the commercial stage for use in the foundry.

Duty of the inhibitors is to restrain or suppress the action of water vapor on the hot metal, and it is necessary to use the chemicals mentioned previously in combination. In general, the amount of combined inhibitors relative to the total batch of sand should be from 3 to 10 per cent, depending on the protection required to prevent burning of the metal.

In addition, an agent often is used to prevent drying out of the sand and decrease the amount of water required. For that purpose diethylene glycol is used, in the average proportion of 1 per cent to the total sand.

With the new No. 220 aluminum-mag-

"BRANFORD"
FLASK RAPPER

★ Made in sizes that will shakeout flasks 2′ square up to 20′ x 24′ x 4′ deep.

★ Jaw construction will take wide variation of flask flanges without change.

THE "BRANFORD" FLASK RAPPER ENTIRELY ELIMINATES FLASK BREAKAGE AND REDUCES SHAKEOUT TIME TO A MINIMUM.

Below is what an 8″ Flask Rapper is doing for one of the many users of "Branford" Shakeout Equipment.

WORK	NO. MEN		TIME PER MAN
Cope 9′ x 15′ 4″ x 14″	Shakeout by Hand	9	25 min.
	With Branford Vib.	2	20 min.
Cope 10′ x 7′ 6″ x 3′ 8″	Shakeout by Hand	7	105 min.
	With Branford Vib.	2	18 min.

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1915 BRANFORD VIBRATORS U.S.A.

Hopper Vibrators
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Vibrator Tables

nesium metal containing 9.50 to 11.0 per cent magnesium, a typical molding sand mixture is as follows: Ottawa silica sand 1000 pounds, Volclay bentonite 30 pounds, boric acid 20 pounds, diethylene glycol 10 pounds, and water 15 pounds.

It will be noticed that sulphur is omitted. This is principally because the sulphur will "black streak" the aluminum and there is not enough magnesium in this alloy to cause burning of the metal. However, if the alloy shows signs of burning, it will be necessary to use sulphur in the mixture.

The batch formula shows 3 per cent bentonite. That is the minimum amount for small castings and where there is little cope. A more usual percentage is 4 per cent bentonite, which with a moisture content of 2½ per cent, will yield a very satisfactory green compression strength.

The metal usually is heated to a temperature of 1470 to 1560 degrees Fahr. and then cooled to pouring temperature of approximately 1290 to 1330 degrees Fahr. The object of preheating before pouring is to refine the grain size of the final casting.

Durability of magnesium sand is good, bentonite bond not being greatly affected by repeated use at those temperatures. In the average shop it generally is not necessary to add any additional clay bond to the backing sand, the re-bonded facing supplying all the bond that is needed by the heap. However, the inhibiting agents are affected by temperature depending on the permeability of the sand used and the weight of the casting. Effectiveness of the inhibitors, therefore, decreases as the sand is used and they must be replaced to a concentration that will serve the protective purpose.

A convenient method is to maintain the total water soluble salts within set limits by additions of silicofluoride and boric acid, while a determination of carbon bisulphide soluble content of the sand will decide the amount of powdered sulphur that is to be added. It is necessary that magnesium sands be vented properly, as well as the cores. Failure to provide for venting the gas will cause numerous defects in the castings which are produced.

Addition of a colloidal clay bond like bentonite to fine sands may result in balls in the sand unless the mixing is thorough. When this occurs, instead of adding more powdered bentonite, it should be added in the form of a slurry. The bentonite is made into a thick gel so that it will be flowable, and this is used instead of temper water to retemper the sand. Mathematically it will be found that only about 0.1 per cent of bentonite can be added to sand by this means, without using excess water but even that small percentage acts as a partial strength-renewing agent if it is done continuously, since the original bentonite addition retains its life for a long time.

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Book Review

A Course in Powder Metallurgy, by Walter J. Baeza, cloth, 212 pages, 6 x 9 inches, published by Reinhold Publishing Corp., New York, price $3.50.

This volume, while designed as a textbook for students studying powder metallurgy, undoubtedly will have a much wider appeal than its title would indicate since it provides information on the basic principles of the subject. Consequently, it should be of interest to all who desire to further their knowledge of powder metallurgy.

The book is divided into 11 chapters, the first two constituting the introduction, history and developments. Chapter 3 discusses production of metal powders while powder specifications and classification of particle size are described in Chapters 4 and 5. Cohesion, and manufacturing problems and machines are topics of Chapters 6 and 7. Chapters 8 and 9 give information on the college course and the laboratory cost for the course of training. Chapter 10 relates to general instructions to students while the final chapter is devoted to the description of 15 experiments with precautions to be observed and a discussion of the results. Numerous illustrations and sketches are included.

Suggests Ways of Prolonging

LIFE OF WIRE ROPE

By F. L. SPANGLER

MANY wire ropes are discarded after a certain length of service because parts have worn or deteriorated. The remainder of the rope, which may be as much as 90 per cent of the original, is in first-class condition. If maximum service could be obtained from every foot of rope, a considerable saving would be realized and the large tonnage of steel thus conserved could be applied to other uses.

Cable operated equipment to which methods of rope conservation have been applied successfully include grab bucket cranes and electric overhead traveling cranes. Where the rope operates over small sheaves and drums, preformed rope often is preferred because of its high resistance to fatigue with resulting increase in service life. However, any method of increasing rope life through utilizing, as far as practicable, all the potential service remaining in the rope, is applicable to either preformed or nonpreformed rope.

How to Correct End Wear

Where the greatest wear occurs at or near the end of the rope, one or a combination of the following methods will result in longer rope service:

(a) When the end becomes worn, crop it off and continue to use the remaining length of good rope. This requires a rope of extra length in the beginning. The surplus is wound on the drum and is of sufficient length to allow as many end croppings as may be considered safe and feasible.

(b) Before the end is so badly worn that it must be discarded, turn the rope end for end, thereby bringing a good section of rope at the point of greatest wear.

(c) Crop off the worn end and in its place substitute a good rope of the same length by splicing or clamping it to the end of the original rope. This splice can be renewed time after time until the original rope is ready for the discard.

Where wear is largely confined to one or more points along a rope, for example at the tangent points of a crane equalizing sheave or at points of crossover in each layer on a multilayer drum, rope life can be increased by cutting off a few feet at the drum end, or by letting out several extra feet of rope through the drum eye. By thus shifting the rope, the points of wear fall at other points on the rope.

When a rope no longer is serviceable in a specific location, the seriously damaged sections may be cut out and the remainder used on some other application. Many such ropes, if still in first class shape are cut to proper lengths and used as slings. However, for reasons of safety, a rope showing appreciable wear never should be used as a sling. Another example is the use of grab bucket closing lines shortened by cropping off the damaged ends, as holding lines or tag lines on the same rig.

Boom cables on cranes and drag lines customarily are replaced while still in fairly good shape as an extra insurance against any possibility of dropping the boom. These cables then may be used as hoisting cables on the same or similar equipment and as drag and trip cables as well as in other services where life and property would not be endangered by breakage of the cable.

Before applying used cable, the mechanic should make sure that the cable diameter will fit the sheave groove. A cable too small or too large will cause unnecessary wear on the sheaves and will require repair or replacement before a new cable is installed.

At the small sheaves in the closing mechanism of a grab bucket use rope of extra length and cut off damaged section at bucket end. When rope is too short to cut, it can be turned end for end, or a short length of new rope can

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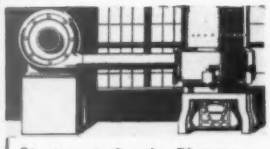

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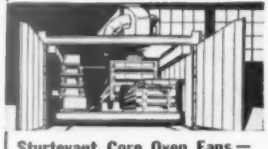

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be spliced on bucket end. For the tag line from bucket to and around small idler sheave on the boom, use rope of extra length with surplus doubled back at counterweight end. Damaged length is cut off, leaving the rope still long enough for use.

On the hoist cable of an electric traveling crane it is advisable to crop off a few inches at one end of the drum about every three months. All cuts must be made at the same end of the drum. Each cropping shifts the position of the rope at the equalizing sheave.

Damage occurs around dipper sheave when shovel is taking a bite, also at padlock end of the hoist line on a dipper shovel. Crop off 2 or 3 feet at the padlock end. Turn rope end for end when too short to crop.

American Brake Shoe Shortens Name

Stockholders at the annual meeting of the American Brake Shoe & Foundry Co. held in New York recently, voted to shorten the name of the company to American Brake Shoe Co. In addition to brake shoes, the company for many years has been making parts in many kinds of metals, metal alloys, nonmetallic compositions and fabrics.

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Aluminum Foundries Study Regulations

Approximately 75 manufacturers of aluminum sand castings and permanent mold castings, representing 13 states from Massachusetts to Iowa, convened at the Morrison hotel, Chicago, April 21, to discuss new and significant government regulations affecting the production of these war products.

Although sponsored by the Aluminum Foundry Division of the Aluminum Association, the meeting was an open one and was well attended by manufacturers not affiliated with the organization. Aside from the purpose already mentioned, the conference constituted an effort to effect a closer co-operation among companies in the industry to further the war production program.

Chief discussion centered around interpretation and clarification of the revised Maximum Price Regulation No. 125 (Revised), issued recently by OPA and CMP. The morning session was devoted to the former, and the afternoon session to the latter. Following brief explanations by government officials of the regulations and mechanics of their operations in relation to materials required for the various procurement agencies, the sessions were thrown open to questions and answers.

One of the aspects of MPR 125 creating the greatest confusion was the mechanics involved in effecting the reduction of 3 cents per pound for aluminum and magnesium castings, and the provision that current metal prices be used in pricing formulas when pricing castings of a different class than previously offered. It was explained that if a reduction already had been effected since Sept. 30, 1941, on old orders, the further reduction is to be the difference between that and 3 cents per pound.

OPA spokesmen asserted that the revised MPR-125 represents all the answers to questions arising through experience with the original order. Because it is difficult to write a regulation which will apply generally, some points may still have to be cleared up in individual cases.

L. E. De Groat, sales manager, Permold Co., Medina, O., served as chairman of the meeting. Speakers representing WPB, Washington, were Frederick Ayer II, chief of the castings section, Aluminum and Magnesium Division; and Albert Butler, statistical expert of the division. OPA representatives were John D. Summer, price executive, Nonferrous Metals Branch; and J. B. Meier, chief of the foundry unit, of the same branch. The Army Ordnance Department and Navy Office of Procurement and Supply also were represented.

George Wright, National Bronze & Aluminum Co., Cleveland, is chairman of the Aluminum Foundry Division of the Aluminum association, and A. J. Peterson, Advance Aluminum Castings Corp., Chicago, is vice chairman. Kenneth G. Castleman, secretary-treasurer of the association, New York, is also secretary-treasurer of the Aluminum Castings Division.

Obituary

FRED J. GRONDIE, for 3½ years superintendent, City Foundry Co., Cleveland, died on May 15 from a cerebral hemorrhage. Mr. Grondie was born at River Rouge, Mich., when the place was a peaceful farming community, some years before the Ford Motor Co. established the present immense plant. Mr. Grondie grew up in Lorain, O., and served an apprenticeship in the foundry of the National Tube Co. Later after the custom of young journeymen of the period, he worked in several foundries in the Middle West and in Canada. He was employed by the Kilby Mfg. Co., Cleveland in 1906, promoted to the position of assistant superintendent a few years later and became superintendent in 1917. He held this position until early in 1940 when he resigned to accept a similar position with the City Foundry Co. He was recognized as a highly competent foundryman in the production of large and intricate gray iron castings for a wide variety of uses. On several occasions THE FOUNDRY was privileged to illustrate and describe outstanding examples of his skilled craftsmanship. He was a constant attendant at meetings of the Northeastern Ohio Chapter of A.F.A., and served as one of the experts on the Quiz program at the January meeting.

° ° °

August T. Sebelien, secretary and treasurer, Davenport-Besler Corp., Davenport, Iowa, died April 6.

° ° °

Rufus L. Patterson, 70, chairman of the board, American Machine & Foundry Co., New York, which he organized in 1900, died April 9 in New York.

° ° °

Joseph W. Hays, 75, founder of what is now the Hays Corp., Michigan City, Ind., died at the family home in Grinnell, Iowa, April 22.

° ° °

Fred G. Sands, 72, foundry superintendent, Jeffrey Mfg. Co., Columbus, O., died in Columbus on May 2. He had been connected with the firm for 34 years, and was foundry superintendent for the past 20 years.

° ° °

Robert M. Porteous, 66, service engineer, Herman Pneumatic Machine Co., died at his home in West Bridgewater, Pa., April 5. Mr. Porteous was connected with the Herman company for approximately 30 years.

° ° °

Charles Fahlstrom, 57, assistant to the president, American Manganese Steel Division, American Brake Shoe Co., Chicago Heights, Ill., died May 10 in Rochester, Minn. Mr. Fahlstrom had been associated with the company 33 years. Prior to becoming assistant to the president recently, he had been vice president for 20 years.

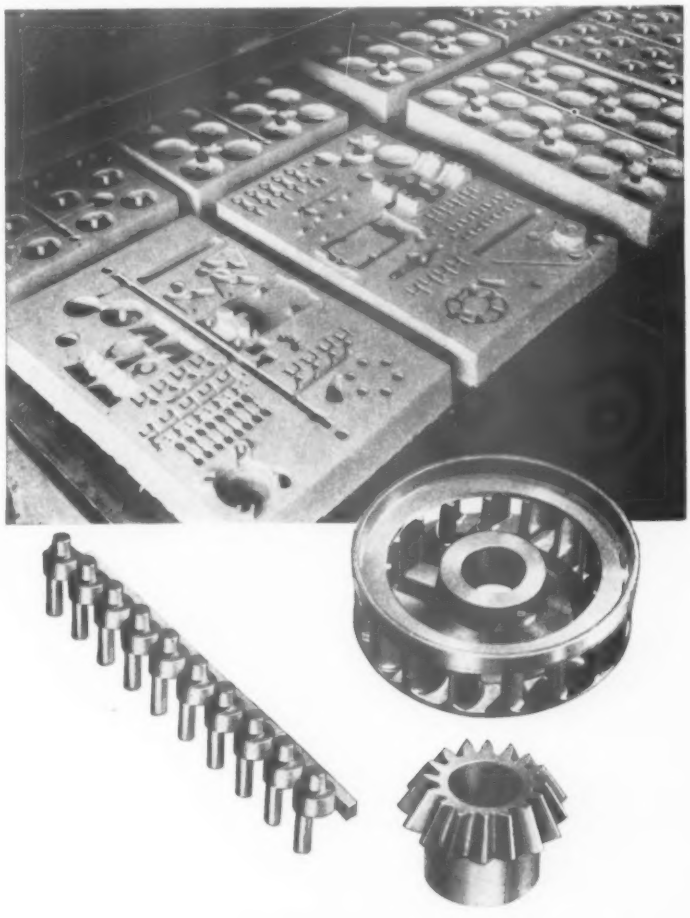
Harry G. Seeboth, 52, president, Milwaukee Bronze Casting Co., Milwaukee, died at Tucson, Ariz., April 9. Mr. Seeboth has been with the casting firm, which was founded by his father Michael and an uncle, Albert, for 33 years of its 35 years. He was a member of the American Foundrymen's Association.

° ° °

Albert L. Austin, sales engineer, Robins Conveyors Inc., Passaic, N. J., died May 2 after a protracted illness. Mr. Austin joined the Mead-Morrison Mfg. Co. as draftsman in 1915, and when the Robins company took over the coal and ore handling products of Mead-Morrison in 1934, Mr. Austin became a Robins sales engineer, covering an extensive eastern and southern territory on projects of a specialized nature.

° ° °

William W. Cooper, 57, superintendent of the steel foundry, Steelton plant, Bethlehem Steel Co., Steelton, Pa., died unexpectedly at his home in Harrisburg, Pa., April 23. Mr. Cooper entered the employ of Pennsylvania Steel Co., later the Steelton plant of Bethlehem Steel Co., in 1898, and served an apprenticeship as a steel molder. He was made superintendent of that foundry in October, 1923.



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FOUNDRY ACTIVITIES

PERMANENT Mold Castings Co., 120 South LaSalle Street, Chicago, has been incorporated by J. A. Gubies, H. W. Biringer, and L. Jarson to manufacture castings, molds, dies, etc.

° ° °

Alloys Foundry Inc., 301 North St. Francis, Wichita, Kans., recently has been organized. O. A. Sutton is president; W. P. Innes Jr., vice president; R. S. Stoltz, general manager, and R. L. Cox, foundry manager. The company will manufacture brass and bronze, aluminum and magnesium castings.

° ° °

Index of new foundry equipment orders for March, according to a report of the Foundry Equipment Manufacturers Association, Cleveland, was 538.6, as compared with 348.1 in February. Index for repairs was 635.2. Index of 100 represents the monthly sales to metalworking industries during 1937-38-39.

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California Steel Co., 115 East 116th Street, Los Angeles, is building a small addition to its foundry.

° ° °

Alum-Brass Foundry, 1518 North Spring Street, Los Angeles is building an addition to its foundry.

° ° °

Standard Enamel Products Co., Culver City, Calif., is erecting a new foundry building at its plant.

° ° °

Enterprise Foundry Co. Ltd., Sackville, N. B., is having plans prepared for rebuilding its foundry recently damaged by fire.

° ° °

Wallaceburg Brass Ltd., Wallace Street, Wallaceburg, Ont., is planning a plant addition.

° ° °

Dow Chemical Co. has purchased the idle plant of the West Bay City Sugar Co., Bay City, Mich., and is converting it into a magnesium foundry.

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California Brass Mfg. Co. Ltd., 1447 Naud Street, Los Angeles, has been issued a building permit for the construction of a foundry addition.

° ° °

Federal Foundries & Steel Co. Ltd., 529 Philip Street, London, Ont., has let general contract to H. L. Sifton, 129 Sherwood Avenue for a plant building.

° ° °

Mammoth Castings Inc., has been organized in Los Angeles county with a capital of $50,000. Directors are Arthur W. Ballard, Edward R. Woodruff, and Arthur V. Ballard.

° ° °

Name of the Steacy-Schmidt Mfg. Co., York, Pa., a subsidiary of the Hardinge Co. Inc., New York, has changed its name to Hardinge Mfg. Co. This involves no change in management.

° ° °

Former plant of the McShane Bell Foundry Co., Hartford Road and Baltimore and Ohio railroad, Baltimore, has been leased to the Johns-Manville Sales Corp., Home Insulation Division.

Robins Revises Name

Robins Conveying Belt Co., N. J., has shortened its name to Robins Conveyors Inc. Thomas Matchett, president of the organization, stated that no change of management, personnel or corporate structure is involved in the change, and that it is one of name only.

Milwaukee Chills have passed the rigid inspection of foundrymen who demand the best. These Chills have been improved to accelerate cooling, insuring sound castings free from internal shrinks and surface checks. They will also prevent molten metal from cutting into the sand. These Chills will cut scrap losses, and reduce welding and cleaning costs.

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ALUMINUM CASTING ALLOYS

(*Continued from page* 128)

the water vapor in it, products of combustion, wet or damp stirring rods, sand condition, etc. Excessive temperatures in melting also are contributing factors in gas absorption. Deleterious effect of moisture may be given more consideration when it is pointed out that one drop of water can gas several hundred pounds of metal.

Pick up of gas by molten aluminum can be held to a minimum by permitting the metal to stand without agitation. Also, in transferring the metal from the melting furnace to the pouring crucible or from the pouring crucible to the mold, keep the stream as short as possible since the longer the stream the greater the exposure, and therefore, the greater the pick up of gas. The higher the temperature of the molten metal, the greater is its susceptibility to gas absorption. Hence it is essential that the temperature of melting and holding should be no higher than absolutely necessary.

Sand Condition Important

Sand condition, particularly with reference to green sand, is important in maintaining a low gas pick up. The sand should be worked as dry as possible. The permeability should also be as high as possible to permit release of gases. Experiments have indicated that a minimum permeability of 25 is necessary to insure against gas pick-up during casting. The molten metal traveling down the sprue and along the gating system may pick up sufficient gas to cause trouble. Therefore, some foundries make the sprues and runners in dry sand to avoid such difficulty. An easy experiment to show how easily molten aluminum may be gassed at the mold is to place a wet cloth around the sprue opening and proceed with pouring.

Nonmetallic inclusions such as dross and oxides often cause trouble, and their removal depends on separation by the sink or float method. Unfortunately, the specific gravity of the undesired components is quite close to that of aluminum and its alloys, and consequently the separation is much slower than in the case of other metals and alloys where the differences in specific gravities are much greater. However, use of gas fluxing or of some of the salt fluxes aids in speeding up the separation procedure. Another method is to melt the metal and then hold in the furnace without disturbance for a definite period. Permitting the metal to remain about 15 minutes for a charge of 300 to 500 pounds seems to be quite effective. The metal temperature should be not much higher than the pouring temperature. If fluxing is employed the procedure should be similar to that previously described—that is fluxing at a low temperature and then bringing the metal slowly up to the desired pouring temperature to provide a suitable period without disturbance. The slight increase in time required by that procedure is well worthwhile when the beneficial effects are considered.

After the drosses and inclusions have been removed, care should be taken in handling the metal from furnace to mold as previously described to prevent recurrence of those detrimental materials. Gating system within the mold should be designed so that a smooth flow of metal is secured without any tendency toward eddying, turbulence, and spurting.

Various types of skim gates or cores are of considerable aid in preventing oxides and dross from entering the casting cavity. Use of a riser on the runner as close to the casting as possible gives good results. It not only acts as a skimmer to carry off oxides and drosses, but also provides a reservoir of hot metal close to the casting for feeding purposes. Stainless steel screens, instead of dry sand perforated cores, may be used. Application of the counterflow principle in the runner system serves extremely well for removing drosses and oxides, in that the runner is extended some distance beyond the farthest gate. The first metal carrying any dirt, etc. flows the full length of the runner, and then

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backs up into the gate—leaving the undesired material in the dead-end pocket. Another procedure to insure only clean metal entering the casting cavity is the use of troughs or pouring basins.

To extend and expedite the recovery of every possible bit of aluminum and its alloys, the foundry often must use extremely dirty scrap resulting in the production of large quantities of dross and oxides. Naturally, it is essential that the recovery and reclamation phases be conducted so that all the metallic content of those drosses and oxides are made available for further use. That can be accomplished by mixing the dross and oxides with fluxes and melting the mixture. Fluxes suitable for that purpose include a mixture of 50 per cent sodium silico-fluoride and 50 per cent sodium chloride, or 50 per cent cryolite and 50 per cent of sodium chloride or potassium chloride. Sufficient flux must be added to dissolve all the oxide, but it is not difficult to determine when that has been accomplished. As long as aluminum oxide is present in the molten mass the flux remains liquid. However, when the oxide is dissolved the flux becomes a dry dross—providing a sharp end point for the completion of the reactions.

In reference to the use of scrap aluminum it might be well to call attention to certain limitations included by WPB in Supplementary Order M-1-d, as follows:

"(b) *Restrictions on use of aluminum scrap.* (1) No person, other than a producer of approved smelter, shall melt reprocess, smelt or otherwise use aluminum scrap unless specifically authorized so to do by the War Production Board on application made by letter to the Aluminum and Magnesium Division. Reference: M-1-D: *Provided, however* that a foundry may remelt its gates sprues and risers if in so doing it does not debase or contaminate the material and if, in applying for permission to acquire aluminum, it reduces the requirements on its suppliers by an amount equal to the anticipated recoverable metal. A foundry may also accept a new casting of its own production, which is found to be defective or was spoiled in machining, and recast and reship it to replace the original casting."

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ELEMENTARY FOUNDRY TECHNOLOGY, (New Third Edition), by L. A. Hartley, revised and brought up-to-date by Edwin Bremer and Pat Dwyer. The accepted standard text on the basic principles of foundry practice. This new edition includes a revised chapter on pig iron to make it conversant with present day practices, as well as a new chapter on malleable cast iron foundry practice. Other subjects covered are: Effects of Elements of Iron; Iron Manufacture; The Cupola and its Operation; Elementary Problems in Steel Foundry Production; Brass Melting; Foundry Sands; Gates and Risers; Molding Machines; Core Machines; and Long Life Molds. Includes glossary and bibliography. $3 postpaid.

GATES AND RISERS FOR CASTINGS, (New Second Edition), by Pat Dwyer, engineering editor of THE FOUNDRY. A complete encyclopedia and practical guide to everyday foundry problems. Answers questions for experienced and apprentice foundrymen on "how to eliminate casting defects". More than 300 different subheadings in the book's 27 chapters cover gray iron, steel, malleable iron, aluminum, brass and bronze casting. Profusely illustrated with helpful drawings and illustrations of the "how-to-do-it" type. Completely cross-indexed. $4 postpaid.

FOUNDRYMEN'S HANDBOOK, (Second Edition). Long a recognized standard handbook on foundry practice. Originally $6, this book has been reduced to $3 because a few specifications are now out of date. However, basic information of cost analysis, and information on formulas, tables, weights and general foundry practice is of value to workmen, foremen, superintendents, managers and owners. Pattern-makers, metallurgists and executives find its contents helpful in meeting everyday foundry problems.

MODERN BLAST CLEANING AND VENTILATION, by C. A. Reams, engineer of Ford Motor Co. Describes latest and most approved methods of casting cleaning in plain language. Full of completely practical suggestions on approved methods and practices. Full information on abrasive selection and use is included. A practical book for practical foundrymen. $4 postpaid.

IMPACT CLEANING, by Wm. A. Rosenberger. Covers both theoretical and practical information on impact cleaning with shot and sand. Presents the "how and why" of high cleaning costs and recommends methods for their reduction. Proper methods of ventilation are also covered. $7 postpaid.

MELTING IRON IN THE CUPOLA. 240 well illustrated pages covering construction, operation and maintenance of the cupola. Suitable for the apprentice and the experienced foundryman. Tables, formulas and a complete cross-index listing more than 1000 items make this a valuable and practical book. $2 postpaid.

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Problems of Electric Melting Discussed

More than 100 melting superintendents, foremen, melters and second helpers on electric furnaces throughout the eastern half of the United States attended and participated in an informal conference at the Morrison hotel, Chicago, May 2. The meeting was sponsored by the Electric Metal Makers Guild Inc. in connection with its expanded activities program and embraced a luncheon, an extended roundtable discussion, and a dinner.

The event was arranged by a special committee from the guild's Chicago section, consisting of Herman Schulz, superintendent of electric furnaces, South Works, Carnegie-Illinois Steel Corp., South Chicago, Ill., chairman; B. J. Aamodt, superintendent, National Malleable & Steel Castings Co., Cicero, Ill.; and A. J. Scheid, metallurgist, Columbia Tool Steel Co., Chicago Heights, Ill.

To stimulate open discussion, the roundtable was headed by two groups of experts, one experienced in steel ingots and the other on steel castings. Members of the castings panel were: Fred J. Blaney, general superintendent, Ohio Steel Foundry Co., Springfield, O.; Martin T. McDonough, superintendent of melting, National Malleable & Steel Castings Co., Sharon, Pa.; James C. Schweitzer, superintendent, Sivyer Steel Casting Co., Milwaukee; George P. Messenger, metallurgist, Kensington Steel Co., Chicago; Eugene H. Weak, electric furnace superintendent, American Steel Foundries, East Chicago, Ind.; and A. G. Gierach, works manager, American Manganese Steel division, American Brake Shoe Co., Chicago Heights, Ill.

Mr. Aamodt conducted the castings symposium, most of which was off-the-record. Some discussion centered on the present-day interest in boron in steel. No one seems to know the amount of this element which is retained in finished steel, and not too much is known about its use. It was pointed out that it should be applied in ladle additions to assure its making contact with the metal and not the slag. Little is known about the recovery obtained.

TRENDS IN CASTINGS USE IN ORDNANCE

(*Continued from page* 129)

everything that lay at hand for the improvement of that terrible situation.

In 1938 when appropriations for ordnance materiel began to increase in a modest sort of way, we seized every opportunity to improve our situation. As fast as appropriations allowed, we brought into production as many as possible of the pioneer industries with whom we had been planning for 15 years. We drove those facilities hard. We used them as a school, as a training ground for the facilities which came in later to make the same items as appropriations increased.

We tested out in those pioneer plants the standardized designs which we had in small scale production in our arsenals. We put to the test our own planning and preparation of the preceding 15 years. We even underestimated the worth of that planning and preparation. We underestimated our own efforts and we underestimated the industry with which we had gone into partnership. In every field of ordnance production today we are getting off a given line, production such as no one ever visualized, and ordnance items are backing up at the seaboards and in our depots while we continue the ruthless operation of continued curtailment. In 1918, we had to rely on French and British ordnance. In 1942, our Allies are using American ordnance.

Problems Not Yet Solved

The problems of Army Ordnance in this war are not yet solved. We have a new grist of them to maintain the market for the production of aspirin—but production of ordnance items in American private industry is not one of them. This new grist of problems deserves further comment.

Before I go into these new problems, let us be sure that all of us understand fully the functions and responsibilities of the Ordnance Department of the Army and the main characteristics of ordnance materiel. The Army Ordnance Department is charged by law and regulation with the design and development, the manufacture or procurement, the supply and distribution to combat forces, and the maintenance and repair in the field of everything which the army has construed to be a weapon or ammunition.

In the category of weapons are guns ranging from the automatic pistol to the 16-inch seacoast gun, all automotive vehicles—not only our tanks and tank destroyers, but jeeps and motor vehicles—all of the armament for aircraft from machine guns to aircraft bombs and flares, and the fire control instruments which enable the artilleryman to get on his target. There is the maintenance equipment which we use for our repair work in the field. Even the soldier's helmet is considered an item of ordnance; it is considered a part of the soldier's armament. Were it considered simply an item of millinery, it would be provided by the Quartermaster Corps.

Much of what I shall say about Army Ordnance applies to Navy Ordnance as well. The country at large little appreciates the degree of co-operation that has been going on for 40 years between the Bureau of Ordnance of the Navy and the Ordnance Department of the Army, a degree of liaison and self integration not approached by any other two corresponding branches of the two services. We have not duplicated any important items of development or investigation. The service that has the major interest in any investigation does the job, and the other takes the results. As more and more items are standardized for joint use by the Army and Navy, either the Navy Ordnance or the Army Ordnance takes over the entire job of manufacture or procurement for everyone. This is as it should be.

Let us look for a moment at some of the characteristics of ordnance items in general. Almost all of our items are non-commercial in character. There is no private armament industry in the United States such as has existed in England and on the European continent for

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years. We have to make our ordnance in private industries which convert their normal facilities for the purpose. In general, ordnance materiel is relatively expensive, built to fairly close tolerances, with a high degree of interchangeability in component parts. Properly maintained, our weapons and ammunition stand up well in storage and are good for use under hard conditions in the field. Quality and dependability are features of preponderant importance. In fact, in no previous war has high quality in ordnance paid in the degree in which it is paying now.

We are shipping our ordnance to two hemispheres and to fronts from the Equator to the Arctic. Shipping is short. When a tank breaks down in the field, the troops cannot wait for a new tank. The old one has to be repaired in place. The Ordnance Department must meet this repair problem, but first of all there is an ever insistent demand that the materiel not break down except as a result of direct enemy action. On the dependability of our ordnance items may turn the whole outcome of a battle, or the personal fate of your son or mine may depend on that degree of reliability.

Some weeks back an American manufacturer of springs put in the trade journals one of the most striking advertisements I have seen. It showed an American doughboy, his arm drawn back, and in his hand a hand grenade ready for throwing over a defilade at an unseen enemy. His comment was printed there. "God help me if this is a dud." That advertisement more eloquently than any other words I can give you pictures our continuing demand for high quality and dependability on ordnance items which are going overseas.

But what of some of these other problems which I mentioned casually? One of them is, of course, the matter of materials. There has been a shortage during the past year not only of the strategic raw materials to which we have been allergic for years but of some of the common basic minerals where we never anticipated an important difficulty. These shortages have resulted in a host of frantic substitutions. Hundreds of men in industry have made technical contributions and have submitted redesigns which have been accepted. Then in the course of events, a shortage often has developed in some overworked substitute material. Probably no group of minds could have reduced this business of the search for ersatz materials to anything worthy of the name of engineering planning. The whole business of critical materials is a gay kaleidoscope of shifting from one new material to another, the tempo of change being further affected by a restive civilian economy now demanding a greater share.

Manpower Major Problem

In our own plants and in the plants of our ordnance contractors, we wrestle with a problem of manpower. However, my admiration for the way the American metalworking industries are meeting this challenge of manpower grows by the day. Even the foundry industry is using women and old men, and the country as a whole will gain from the resourcefulness which the women and the old men and the physically handicapped are showing in this emergency.

One of our most fascinating problems is that of the new designs demanded by the changing tactics of war. These demands continue to come, for in the last analysis, the battle field is the only suitable testing ground for ordnance. However, we have a beautifully-working partnership with the design and research agencies of the country. We have straight lines of communication back from the fighting fronts as to the performance of our materiel compared with that of the enemy. We are in a position to act quickly and the demands are a constant challenge. It is a challenge we must meet, and when new items have been developed, we will get them into frenzied over-night production in a capacity that exists, in facilities already well schooled in the art of resourceful conversion.

I must mention our overseas packaging problem. Here is one of those unexpected villains that came up on us from behind and caught us napping. In the first World War we got most of our

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ordnance, except small arms, ammunition and personal equipment, from the developed production of our allies. We shipped overseas enormous quantities of raw and semifabricated materials and powder and high explosives, but these presented no serious overseas packaging problem. Soldiers going overseas carried their own small arms and personal equipment and took good care of them in transit. Small arms ammunition has always been well packed and our small arms ammunition people never seemed to have yielded to our demands for lighter or cheaper packing; hence, our small arms ammunition got overseas in good shape. The automotive industry was already educated in the packing tricks incident to the export of cars and trucks. When ships got to debarkation points in France they docked at facilities already well established for taking care of the materiel. By the time our heavy ordnance industry got into high gear in that war, the war was over.

Learn How To Ship Goods

We never got to learn the tricks and dangers in the packaging of the more complicated items of Ordnance for the worst conditions of salt water shipment. More than that, we were not dumping expensive items of Ordnance from lighters onto beach heads. In these days it is the common practice to put many expensive ordnance items lashed on the decks. The routes cover extreme heat and extreme cold, often on the same trip. This is the best possible setting for condensation of vapor on metal surfaces; hence, corrosion. The goods on the deck under alarm of attack are doused with salt water to reduce fire hazard. At the end of the route, the unloading is often done through surf. This has been a discouraging problem, but at the moment, I can report that we have learned most of the lessons and we are putting our experience into successful practice.

Then there is another problem which we face, a problem which, in fact, encompasses all the rest. That is the problem of overall efficiency in our Ordnance operation. This problem has its roots, of course, in the manpower shortage, but it brings in the matter of materials, of machine tools and equipment, and of assurance of quality that is almost automatic. If we can produce our ordnance with greater ease than formerly, or with greater ease than our enemies, with less waste motion, or from less costly materials, and still meet those stringent requirements of your son and my son on the battlefield, we shall be making a continuing contribution to the winning of the war.

I have now sketched a background. Now for the more immediate matters of the casting industry.

Castings are not new in ordnance construction. Historically they antedate most of the other known means in the fabrication of weapons and ammunition. For years past many of the parts of artillery carriages have been steel castings, particularly the components of seacoast gun mounts and army and navy pedestal mounts. Watertown Arsenal did pioneer work in centrifugal casting of guns. We allowed steel castings as an alternate method in the fabrication of infantry mortar shell. There were some cast parts in our automotive combat vehicles, but the percentage was certainly no higher than for the commercial automotive industry. That castings were not used more extensively was not because of cost, for cost alone is never a deciding factor in ordnance construction. It was probably the lack of inspection procedures and inspection technique in which we could place full confidence that retarded our more general use of castings in ordnance items.

A very different story must be told about our ordnance of today. There is a constant search for opportunities to eliminate parts which must be fabricated by conventional machine tools. Stampings have shared with castings huge savings in fabrication. There have been important technical advances in heat treatment of steel castings. In the manufacture of repetitive ordnance items there have been steel mill tricks for assuring a continuous supply of hot metal, such as the Ford triplex combination of cupola, converter, and steel furnace; and individuals in the foundry industry have made outstanding contributions to

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many phases of ordnance production.

Here in the St. Louis Ordnance District, we take special pride in two men. Carl Morken, of Carondelet Foundry Co., St. Louis, is a technical consultant to the Office of the Chief of Ordnance. He has searched out literally a hundred or more opportunities for ordnance casting. And all of us take pride in another local man, Harry M. Pflager, of General Steel Castings Corp., one of the grand old men of the steel casting industry, who last week was recognized with the Henderson Medal of the Franklin Institute. Mr. Pflager, it is agreed by everyone having knowledge of this subject, was the first man to suggest cast armor one-piece hulls for tanks, a suggestion that certainly had far reaching final results.

The steel casting industry has been particularly aggressive in selling itself to the Ordnance Department. Perhaps that is one of the reasons why ordnance expansion almost alone has multiplied the steel casting capacity of the country by five in the last 2 years. Almost half of the total weight of a modern M4 tank with cast armor hull consists of steel castings. Two years ago my British friends tried to impress upon me the advantages of cast steel aircraft bombs. Thank goodness your Ordnance Department did not fall for that! In the first place cast steel is not the proper material for the American concept of an efficient demolition bomb. In the second place, an industry already multiplied by five ought to be satisfied with confining itself to the items for which it is best adapted. The cast steel parts in ordnance today are legion, but, of course, it is in the automotive combat vehicle field that you steel casters have really come into your own. Even with the tremendous cutbacks in our tank program, the expansion of facilities has gone on and the need for steel castings in ships and in chemical plant construction and other war needs not previously visualized have taken up the slack.

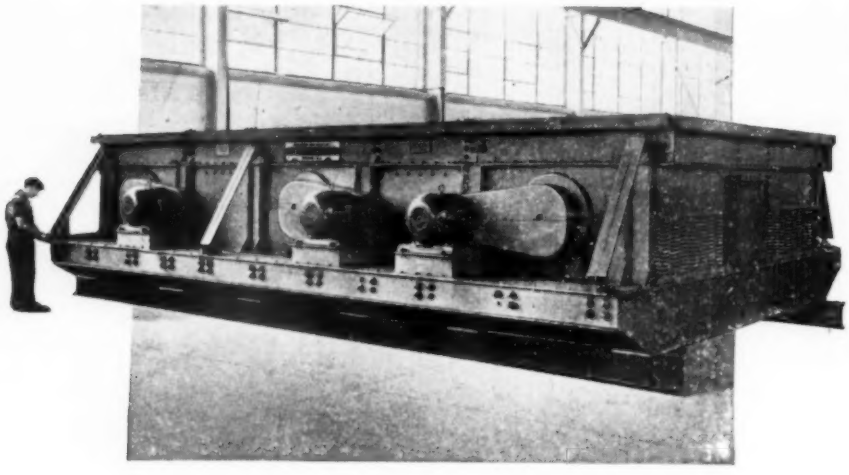
You steel casters will be interested to learn that the bessemer process is likely to be reinstated in the federal specifications for steel casting. The Ordnance Department expects to recommend the reinstatement, and being the largest user under the specification, it is likely that the recommendation will be accepted. Confession and mutual recrimination are sometimes good for the soul. The Ordnance Department has followed the lead of the progressive steel casters of this country in an enormous use of this foundry product, but there are still steel foundrymen who operate under the opinion that as long as the metal will lie in the mold, it is necessarily well made steel for ordnance use. Most of your peacetime steel castings could be based on designs sufficiently massive to take care of a considerable number of small sins. *In modern Ordnance mobility and light weight are absolutely essential characteristics.* We must have more fire power per unit weight of ordnance equipment in the field than the enemy. This means that the steel caster must pay special attention to his steelmaking process, particularly that of deoxidation.

Climatic Conditions Vary

I have cited the wide variation in climatic conditions under which we are operating, and we do not know how soon the center of our activities may shift further north. Many of our ordnance castings are required to take heavy impact loads and many castings must have high impact resistance at low temperatures.

The continuing argument over impact resistance at low temperature is probably going to force the department into a specification which will require steel foundries to qualify in this regard much as our Navy Ordnance friends qualify the producers of major caliber armor-piercing projectiles. Under such a specification the foundryman could select any type of heat treatment which he wished and any chemistry of steel, but to qualify he would produce a steel which would have a minimum of 10 foot-pounds impact resistance at —50 degrees Fahr. Once that procedure is established for that foundry, it cannot be changed without requalification.

Steel castings have come to stay in ordnance, but this constant struggle to get more fire power per unit weight will drive and compel you steel casters on-



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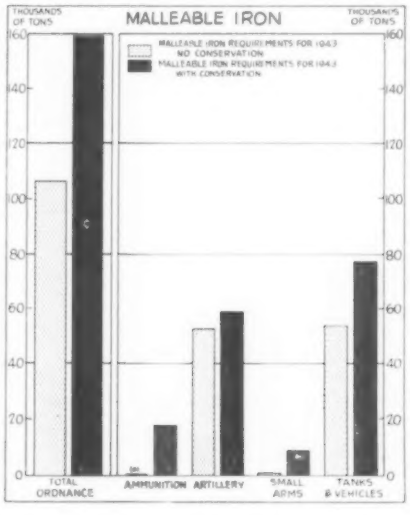
tinuously to improve your product and to expand its possibilities. Otherwise some other method of fabrication will make inroads on the extensive ground you have gained, for in this ordnance business, competition is as ruthless as it is in the normal business of peace.

We in the Ordnance Department may squabble with our steel casting friends, but the squabbles are within the family. Our relations are intimate. We give our unreserved admiration to the aggressiveness this industry has shown. More often than not, they have led and we have followed. Now that we are needling them toward further accomplishment, I do not expect them to fail us. And the end of this war will see the steel foundry industry of the country as a young industrial giant ready to tackle the battles of the peace.

Let us turn now to the malleable industry. This industry has not had a big war expansion. In some 100 Grade A malleable foundries and some 25 more that specialize in pearlitic malleable, there is much residual unused capacity today.

There has been substitution of bronze parts in gun mounts, parts such as pintles, with malleable castings. Malleable has been used successfully for artillery fuze bodies, for gear cases and other parts on artillery carriages, for pistons, and for a long list of other ordnance items, most of which were formerly produced by machining from steel bar stock or from nonferrous materials now critical. One of the accompanying



charts shows quantitatively the extent of these substitutions to malleable iron; the other chart shows substitutions to gray iron. During the last 3 months there have been 64 more such conversions to malleable adopted.

I believe that malleable has a potential future in ordnance materiel. Its good shock resistance dictates such a belief. When subjected to blows, it shows high deformation before fracture. The castings distorted during the long anneal can be squeezed back to size. There are alloy malleable irons that have great possibilities as future engineering materials. You will note that I said there was a *potential* future for malleable.

There are certain things about the malleable industry and its relations with the Ordnance Department that, frankly, I do not understand. We may fight and pull hair with our steel casting friends, but we are at least intimate with them, and from our battles, both Ordnance and the industry have gained. We have no such intimacy with the malleable industry. The great part of the conversions to malleable that have been made, have come from the efforts of the department and from the help of Carl Morken—not from the participation of the industry as a whole. My Ordnance engineering friends complain that there has been a strange lack of aggressiveness on the part of the malleable foundrymen in this ordnance business. You do not need to flood Washington with salesmen but with ideas. The malleable casters themselves have the experience to recognize possibilities for profitable conversion, far more than anyone in the Ordnance Department, and we believe that a lot of experience and knowledge in this industry has not been organized into efficient utilization in the war effort.

And many of the malleable castings our arsenals and prime contractors have been getting recently are bad castings—mostly from improper anneal, and these

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instances have come back to haunt our engineering people who pushed the conversions. These instances have given malleable castings a bad name which the real potentialities of this material do not warrant. Where the basic faults lie, I do not know, but the need for correction should be a challenge to the malleable industry as a whole.

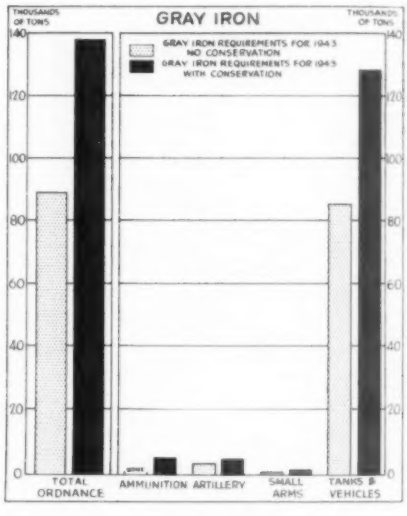
Now let us turn to that huge and sprawling industry of the gray iron founders. The 5000 cupolas of the country, with a melting capacity equivalent to the whole iron and steel industry, constitute a "yawning maw" which the requirements of war or peace could not fill to the brim.

The continuing trend to mobility rather than mass in our ordnance, together with the known behavior of gray iron under the shock of high explosive —these facts put gray iron in some basic limitations in the ordnance business. But there have been literally thousands of outlets for gray iron in our home front needs. With the heavy strain on the steel casters, the gray iron foundries have collected many crumbs from the rich man's table. In fact, I am amazed at the extent of those crumbs. The best figures on which I can put my hands seem to indicate that in 1942 the ratio of gray iron castings to steel castings was about 6 to 1, or about what we got in peacetime, and this with an enormous expansion of the steel casting industry.

There is apparently depression in the gray iron foundries in some sections of the country. Some foundries have converted to aluminum and still others have put in electric furnaces, and have gone into steel. But the gray iron casting tonnage for the country is far higher at this moment than in 1938.

And do not believe that the Ordnance interest in gray iron castings is confined to machine parts, lathe spindles, drawing dies, and other equipment needs of the home front. We are making today some gears and bearing parts for mobile anti-aircraft guns in gray iron castings. The tonnage is small but significant. About two good foundries can keep up with the war effort in the production of our hand grenades—a traditional cast iron item.

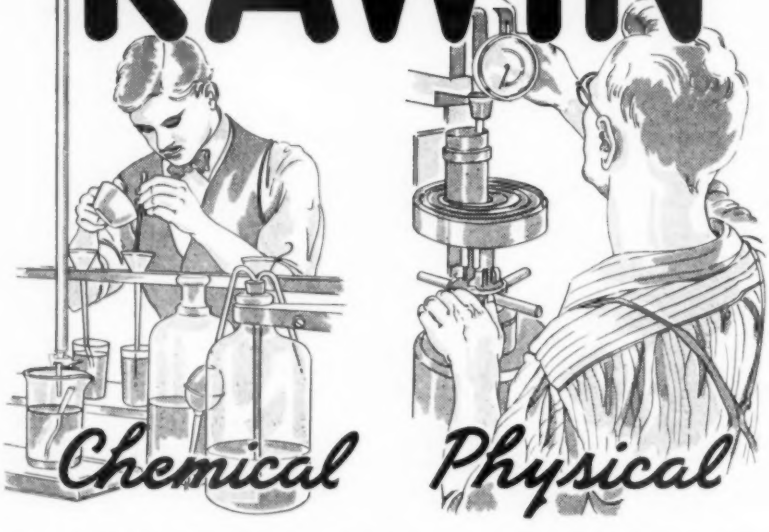
We have now discussed three branches of casting industry, and in two of them the ordnance trend was upward, for one of them sharply upward. The third has an enormous place in our secondary needs of the home front. To the nonferrous founders, I can say that they are like the poor, we have them always with us. Ordnance has always been a big user of nonferrous castings, and that condition still prevails. The problem of our getting things from this industry in this war has been largely a matter of material shortages beyond the control of either Ordnance or the industry.



We have had the joint problem of constant down-grading in materials, a trend that still continues in ordnance nonferrous castings. We have had good advice from experienced men in the nonferrous industry on this down-grading, but we need even more. Personally, I want to gaze on a casting floor where the foundrymen must be clean and tidy, or they perish.

In closing, I offer the contention that at the end of this long-drawn-out war, the foundry industry can say to Army Ordnance: "You have left us in better shape than you found us. We have gained, as Army Ordnance has, from our close association."

KAWIN



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ALLOCATE CORE COSTS

(*Continued from page* 132)

Costs" (Fig. 5) at the close of the month.

Time in the core department that is not charged to individual pattern numbers is reported on "Core Indirect Labor" forms (Fig. 4). A separate form is used for each employe. Each day the employe enters the hours and fraction thereof spent on each kind of work in the column shown at the top of the form. The cost clerk inspects, daily, the entries made to these forms to insure that the totals of the times recorded coincide with the time recorded on the attendance record from which the pay is determined.

At the close of the month, the cost clerk secures the core indirect labor sheets from the several employes in the core department. The clerk then adds the reported hours for each class of work, entering the totals on the "Total" lines at the bottom of the sheets. The clerk next multiplies the total times for each class by the hourly wage rates of the employes, and enters the results in the "Labor Cost" spaces at the bottom of the sheets. Labor costs of the several employes, for each kind of work, are added and the totals entered to the monthly cost schedules, as follows:

Mix—Core Material costs (Fig. 2).

Dry—Combined with burden cost and sum entered on schedule of core costs (Fig. 5).

Miscellaneous.—Burden schedule (Fig. 6).

Other Work—Burden schedules of other departments chargeable.

Defines the Burden

In the operation of every foundry core department there are many actual expenditures of cash and allowances for the wasting and use of physical assets that can not be practically allocated directly to individual cores made. These items are often designated as overhead, indirect expenses, load, burden, etc. The term "burden" is used herein to represent costs of this nature.

At the close of each month, a schedule of burden costs (Fig. 6) is prepared. This schedule combines the costs of the various kinds of expenses chargeable to each of the three coremaking activities, mixing materials, shaping and drying. Amounts chargeable to each activity are determined by sensible analysis and distribution.

Consideration is given to two types of burden costs. First, fixed or those costs which do not vary because of fluctuations in volume of foundry output; second, variable or those costs which vary because of fluctuations in volume of foundry output.

Fixed expenses consist of depreciation, property taxes, property insurance, supervision, records. The total annual cost of these expenses, allocated to each activity (material—shape—dry) is divided by 12 months to determine the charge for one month.

Variable expenses consist of power, air, repairs, supplies, indirect labor, and miscellaneous. The total monthly costs of these expenses, allocated to each activity (material—shape—dry) is added to the monthly fixed expenses, and the total thus obtained made a part of core production costs (Fig. 5) as follows:

Material—Core material costs (Fig. 2).

Shape—"Burden" column, "Shape" section (Fig. 5).

Dry—Combined with sum of labor costs of employes engaged in tending core ovens (Fig. 4). The total thus obtained, is entered on the "Total" line, in the "Drying Cost" column of the "Schedule of Core Costs" (Fig. 5).

At the close of the month's operations, the job time cards, recording the labor costs of separate jobs, are removed from the pending file and used to prepare a basis for calculating core costs for the month's production (Fig. 5).

1—A description of each job is entered to the schedule, showing: (a) Pattern Number. (b) Kind of Core. (c) Number of Cores in one Casting.

2—Monthly production of each job is entered to the schedule, showing: (a) Cores Shaped. (b) Hours. (c) Labor Cost.

Material cost for each kind of core pro-

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Boost your daily tonnage with Cupola Air-Weight Control!

Increase your output, and you'll release some other foundry's facilities to produce *more* castings for gun mounts or other fighting equipment. Installing Foxboro Air-Weight Control on blast lines can give you an extra ½ to 1 ton of *good* castings, daily!

Foxboro Air-Weight Controllers control the blast by *weight* of air, instead of volume. They keep the heats uniformly hotter . . give more perfect castings per tap. Eliminate pigging, save pouring time and fuel, too. And do it automatically, regardless of the weather!

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duced during the month is calculated as follows:

1—Weight (either measured or estimated) of material in each core is entered in the "Each" column of the "Weight" section of the schedule.

2—Number of cores shaped is multiplied by the weight of each core, and the result entered in the "Total" column of the "Weight" section of the schedule. These weights are then added and the total entered at the bottom of the sheet, or at the bottom of the last sheet if more than one sheet is required to record the month's transactions.

3—Total cost of materials used in the month (Fig. 2) is entered at the bottom of the "Cost" column of the "Material" section of the schedule, or at the bottom of the last sheet if more than one sheet is required to record the month's transactions. This material cost ($786.86) is allocated to each kind of core on the basis of weights of core material shown in the "Total" column of the "Weight" section.

4—Total burden cost for shaping ($502.44) is allocated to each kind of core on the basis of direct labor hours shown in the "Hours" column of the "Shaping" section.

5—Total labor and burden costs for shaping each kind of core are added and the sum entered in the "Total" column of the "Shaping" section.

6—Total drying cost ($253.87) is distributed to each kind of core on the basis of total weights shown in the "Total" column of the "Weight" section of the schedule.

7—Total production cost is obtained as follows: (2669 Top cores)

Material	$57.30
Shaping	16.70
Drying	19.07
Total	$93.07

or a cost for each core of $0.093

8—At the beginning of the month there were on hand:

200 top cores	@	$0.090 each	$18.00
416 bottom cores	@	0.060 each	24.90
2000 pin cores	@	0.010 each	20.00

These quantities and values are entered in the "On Hand First Of Month" section. Quantities on hand are added to the quantities shaped during the month and the totals entered in the "Pieces" column of the "Total" section of the schedule. Values of cores on hand at the first of the month are added to the costs of the cores produced during the month and the totals entered in the "Value" column of the "Total" section of the schedule.

9—At the close of the month, an "Operating Costs, Inventory and Profits" schedule (Fig. 7) is prepared. Cost statistics relative to the several operations for each pattern are summarized and entered thereon. The cost of the number of cores used and lost in setting up molds is calculated on the schedule for core costs and the amounts entered in the "Cores" column of this schedule. The number of cores used in setting up molds, determined from the record of molds made ("Pieces" column of the "Produced" section) is entered in the "In Molds" column of the "Used" section the "Schedule of Core Costs" (Fig. 5).

10—At the close of the month, the unused cores, for each pattern, are counted and the total entered in the "Pieces" column of the "On Hand Last of Month" section of the schedule (Fig. 5). These quantities are multiplied by the latest cost of each, as reported in the "Each" column of the "Production Cost" section of the "Schedule of Core Costs" (Fig. 5). Results of these calculations are entered in the "Value" column of the "On Hand Last of Month" section of the "Schedule of Core Costs" (Fig. 5).

Note—The sum of the number of cores lost as the result of shaping, drying and setting in molds for each job is entered in the "Lost" column of the "Used" section of the "Schedule of Core Costs" (Fig. 5). This number of cores is determined as follows: (See pin core on Fig. 5).

Cores on hand, first of month		2000
Plus—cores produced during month		900
		2900
Less—Cores in good castings	2400	
—cores on hand last of month	475	2875
Lost		25

11—The value of cores used, and to be charged to production of castings, is determined as follows: (See pin core on Fig. 5).

Here is a Lanly Oven with four compartments, four heaters and four sets of control instruments.

A different temperature can be maintained in each compartment economically and within the closest possible limits. All known safety devices are incorporated.

Each month Lanly is privileged to add to its impressive list of purchasers the names of outstanding manufacturers whose discriminating standards constitute an implied endorsement of products purchased.

We invite the searching investigation of the most experienced foundrymen, feeling confident that they will find in Lanly Ovens every feature they demand *plus exclusive valuable advantages.*

Write for the Lanly Catalog describing rack, car, drawer and shelf type ovens; or to speed matters, send your specifications along for a proposal.

Also
HEAT TREATING OVENS
•
PAINT OVENS
•
RUBBER CURING OVENS

THE LANLY CO.
750 PROSPECT AVE. • CLEVELAND, OHIO

Value of cores on hand, first of month		$20.00
Plus—cost of cores produced during month		9.79
		$29.79
Less—value of cores on hand last of month		5.23
Cost of pin cores used		$24.56
Plus—value of top cores used		111.97
—value of bottom cores used		71.64
Charged to month's production of castings		$208.17

12—When all the monthly entries have been made to the "Schedule of Core Costs" (Fig. 5), and the several monetary columns added, the schedule is balanced as follows:

Material cost		$ 786.86
Shaping cost—labor	$640.10	
—burden	502.44	1142.54
Drying cost		253.87
Total production cost		$2183.27
Value of cores on hand, first of month		990.99
		$3174.26
Used in molds and lost		2210.16
Value of cores on hand, last of month		$ 964.10

This balancing feature insures accuracy of the several additions and deductions made during the preparation of the schedule.

The schedule of "Operating Costs, Inventory and Profits" (Fig. 7) is prepared at the close of the month for the purpose of bringing together the material (Metal) and operating costs for each pattern used during the month. This schedule also shows the inventories of each item, sales values obtained from customers and profits realized.

The author, in his practice as a foundry cost consultant, has found types of foundry work that warrant the application of core costs based on the inclusion of core materials in the core department burden, thus allocating the material cost to individual cores on the basis of the hours spent in shaping, assembling and blacking. He has also observed other methods of charging core costs to individual castings. The most prevalent being:

(a) Inclusion of core materials in the burden of the core department and the distribution of the burden to individual core jobs on the basis of the labor costs for shaping, assembling and blacking. This method is usually unreliable because of fluctuating wage rates caused by the skill required to produce some cores as against the skill required to produce other cores.

(b) Inclusion of the entire cost of operating the core department in the molding burden, thus distributing the cost of cores to individual castings on the basis of the time or labor cost to set up the molds. By this method the jobs that require little or no core making are charged falsely with costs not caused by them, conversely, other jobs requiring more coremaking are not charged with enough core making cost.

(c) Distribution of the cost of operating the core department to individual jobs on the basis of weight of good castings produced. In a foundry making a variety of castings with different weights and shapes, there can be no prevailing relationship between the cost of making cores and the weight of the casting, therefore the use of this method is unreliable.

In order that the individual foundryman may determine how much detail is necessary for the dependable allocation of core costs to individual castings produced, the author suggests preparation of similar schedules as set forth in this presentation and calculate the costs for one month's production based on them. Comparing the results thus obtained with costs obtained by his present methods (if different from this one) will determine definitely which method is practical for him to use.

Sets Safety Apparel Material Standard

Recommended commercial standard for materials for safety wearing apparel has been issued by the National Bureau of Standards and circulated among the industry for written acceptance. Its purpose is to provide protection to the wearer of safety wearing apparel through the establishment of standard minimum quality requirements and methods of test for the material used in such apparel; to serve as a basis for fair competition between manufacturers; and to provide a foundation for guaranteeing quality of materials used.

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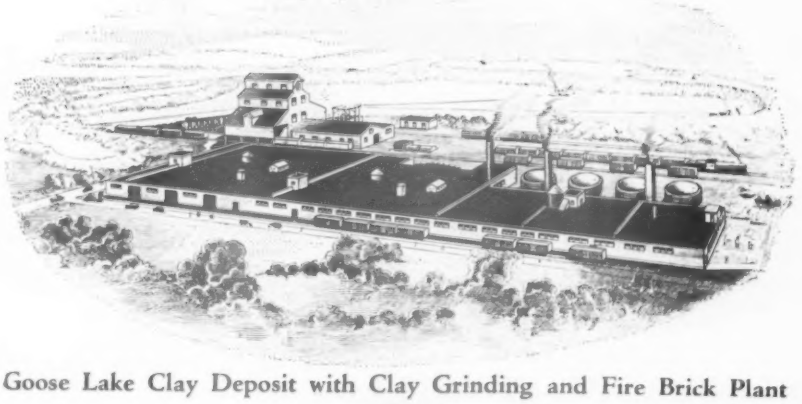
Fire Clay Flour
Fire Clay Brick
Therm-O-Flake Insulation



Goose Lake Clay Deposit with Clay Grinding and Fire Brick Plant

Illinois Clay Products Company

JOLIET, ILL.

FATIGUE PROBLEM IN INDUSTRY

(*Continued from page* 133)

of cells or organs of the body with resulting loss of power. Fatigue which is the natural result of work in moderate degrees is desirable since it leads to rest and renewed vigor.

Here is a statement by Dr. J. R. Gardner: "Glycogen is the chief source of muscular energy. When muscular contraction takes place, its available oxygen enters into a chemical combination resulting in the disintegration or combustion of its glycogen, followed by the formation of carbon dioxide and lactic acid, both of which are powerful underlying contributors toward the induction of muscular fatigue and constitute the etiological factors while the exciting factor is work." We also hear of false fatigue. This is an abnormal exaggeration of the feeling of weariness, brought on by a mental state. Mental fatigue, sometimes called "nervous" or psychological fatigue, is sensory, producing dull "feeling tones" and staleness.

Not necessarily listed in the order of their importance, below are some brief notes on causes, results, and remedies of fatigue.

Causes:

Environmental, such as sound, light, temperature, congestion, lay-out of work, etc.

Drugs, alcohol.

Monotony.

Strenuous life, including too much eating and smoking.

Poor posture.

Home problems—surroundings, family relationships.

Working hours.

General living conditions.

Irritability, hesitancy and impulsiveness, difficulty in making decisions, feeling of helplessness, lowered moral resistance, overexertion of will by too many petty decisions, worrisome responsibilities, frustrated efforts, baffling restraint, bursts of anger, dissension, friction, etc.

General health. Tuberculosis, cardiovascular-renal conditions, diabetes and syphilis are some maladies which bring on fatigue after only little effort.

Results:

Unsteadiness of attention.

Lack of interest.

Inaccurate movements.

Lessened ability to perform, thus decreasing production and efficiency.

Increased labor-turnover.

Increased accidents and proneness to them.

Increased absenteeism.

Quality of production diminished.

Mental aptitude lowered.

Susceptibility to disease increased in direct ratio to lowering of vitality.

Liability to commit errors heightened.

At worst, physical, nervous or moral breakdown.

Remedies:

Prevention of causes wherever possible.

Interest.

Stimuli or powerful motives, such as love, patriotism, loyalty, ambition, responsibility, et cetera. These will counteract initial feelings of fatigue and will produce a condition similar to an athlete's "second wind." Excess, of course, is dangerous.

Rest—sleep.

Quiet, especially for intellectual pursuits.

Proper ventilation. Sixty-eight degrees Fahr. is most favorable, although it is a fact that for certain operations, mostly in the metals industry, workers are subjected necessarily to extremely high temperatures. Heat fatigue was once an industrial problem but is swiftly being eliminated through modern methods of prevention.

Proper lighting—sufficient degree of intensity and evenness of illumination.

Vacations—several short ones rather than one long one.

Hobbies.

Sports.

Physical fitness.

Adjustment of hours of employment.

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Stearns MAGNETIC PULLEYS

Magnetic pulleys are a most widely used form of magnetic separator due to their flexible size range, ready adaptability to various types of conveying systems, their efficient, economical and automatic operating qualities.

We are proud of being selected by leading engineering and equipment supply firms to furnish Stearns Magnetic Pulleys and Separators for foundry installations.

If you are a present or prospective user of magnetic pulleys we will be glad to send Bulletin 302. Write for it.

THE STEARNS POWERFUL AIR-COOLED MAGNETIC PULLEY

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SEPARATORS DRUMS ROLLS
CLUTCHES BRAKES
SPECIAL MAGNETS

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662 S. 28th St. Milwaukee, Wis.

Job simplification.

Elimination of lost motion.

Elimination of crowding in factories. Also, arrangement of work for greater comfort.

Improvement in nutrition.

Improvement in industrial morale.

Adoption of rest periods is important. Actual experience shows that fatigue has been lessened, production increased and accidents minimized where rest periods have been instituted.

Music—installation of public address systems wherever possible for the purpose of supplying music to counteract machinery hums and other noises, to stimulate rhythmic movements and mental well-being. Experiments along this line have proved very successful in Great Britain and South America, and it is surprising that more establishments in this country do not follow suit.

In conclusion, it is apparent that for the duration we shall not be able to do much to offset physiological fatigue. We can only attempt to minimize it wherever possible without jeopardizing the war effort. However, there is much to be done in eliminating psychological and environmental fatigue, and this can be accomplished through a better understanding of the actual causes, through education and publicity.

Metal Trades Group Elects Officers

Three executive officers of the National Metal Trades Association were nominated for re-election at the association's annual meeting held at Chicago, May 27. The officers are: President, Roe S. Clark; vice president, H. H. Kerr; and second vice president and treasurer, George A. Seyler. Mr. Clark is vice president and treasurer, Package Machinery Co., Springfield, Mass.; Mr. Kerr, president, Boston Gear Woorks, Quincy, Mass.; and Mr. Seyler, vice president, Lunkenheimer Co., Cincinnati.

Councillors named for two years include: Dwight K. Bartlett, Builders Iron Foundry, Providence, R. I.; C. B. Fitts, Standard Electric Time Co., Springfield, Mass.; Harry Arter, Arter Grinding Machine Co., Worcester, Mass.; Dana W. Norris, C. C. Bradley Co., Syracuse, N. Y.; William S. Armstrong, Henry Disston & Sons Inc., Philadelphia; R. A. Mitchell, Pittsburgh Forgings Co., Coraopolis, Pa.; Otto G. Hitchcock, Hayes Mfg. Co., Erie, Pa.; J. L. Schultz, National Broach & Machine Co., Detroit; W. D. Hamerstadt, Rockwood Mfg. Co., Indianapolis; T. J. Morton Jr., Hoosier Lamp & Stamping Co., Evansville, Ind.; and C. R. Rosborough, Moline Tool Co.,

Acquires Rights to Rust Preventive

Johnston & Jennings Co., Cleveland, manufacturer of tank fittings and industrial stokers, has purchased exclusive manufacturing and sales rights of Rusta-Restor, a cathodic process for preventing rusting of water tanks, piping and similar steel structures.

Book Review

1942 *Book of A.S.T.M. Standards*, Part II, Nonmetallic Materials—Constructional, Part III, Nonmetallic Materials—General. Published by American Society for Testing Materials, 260 South Broad Street, Philadelphia. Price $9 for either part to nonmembers, $6 to members (for extra copies).

Each part includes the respective tentative specifications and tests as well as those adopted as standard. Emergency standards and emergency alternate provisions also are furnished with each part. Part II contains 1520 pages covering 415 standards for various constructional materials, including cementitious materials, concrete, masonry building units, ceramics, pipe timber and preservatives, paints, road materials, waterproofing materials, soils, thermal insulating materials and general testing methods. Part III, consisting of 1725 pages, lists 345 standards for fuels, petroleum products, electrical insulating materials, rubber, textiles, soaps and detergents, paper, plastics, water, general testing methods and thermometers.

Part I, Metals, issued simultaneously with the other two parts, was described in the May issue of THE FOUNDRY.

MARSCHKE
Floor Stand Snagger

MADE for Extra HEAVY FOUNDRY DUTY

This extra heavy duty Marschke AC Multi-Speed Grinder answers today's Victory call for production on the one hand and conservation on the other. The spindle runs exceptionally smoothly due to its large diameter and accurately fitted bearings so well supported in the rugged base. That develops steady contact between wheel and work piece and is the first requirement for efficient grinding. The combination of this smoothly running spindle with provision for maintaining correct wheel speed during all stages of wheel wear gives maximum cutting with minimum wheel consumption—greatest poundage of metal removal with lowest abrasive cost. The grinding efficiency is supplemented with safety—heavy steel guards, automatic spark shield adjustment with mechanical devices to prevent possibility of overspeeded wheel. Here is the machine to do the bigger job demanded today. It is made for 24" or 30" wheels and 10 to 25 HP motors to meet YOUR PARTICULAR NEEDS. Write for Heavy Duty Grinder and Buffer Catalog.

The Marschke Line of over 70 standard specifications includes Pedestal Type, Floor Stand and Swing Frame Grinders and Buffers for AC and DC power with motor sizes ranging from 1 to 25 HP.

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Established *1905*

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FLEXIBLE SHAFTS

Thirty-Eighth Year *1943*

TYPE
M7A
1½ H.P.

FLEXIBLE SHAFTS AND MACHINES
OF
HIGH QUALITY FOR
HUNDREDS
OF PORTABLE OPERATIONS
ON METALS

Vertical and Horizontal Types
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Over Sixty Types and Sizes

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High Speed Steel
ROTARY FILES — ROTARY CUTTERS

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THERE is no secret about the long life of the new A-H Nozzle. Its patented ceramic insert enables the nozzle to last for hundreds of hours under the most severe operating conditions. Because of its nearly diamond hardness and extreme density the nozzle orifice wears slowly, and does not "bell out" rapidly, giving greater uniformity to finished work and faster cleaning.

Saves 25% to 400% on initial cost alone. Thousands in daily use in foundries everywhere. Write today for descriptive Bulletin No. 17.

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PROBLEMS OF PLANT PROTECTION

(*Continued from page* 135)

in search of any easy $250.

Adequate lighting is another prime requisite of good plant protection, but it is not difficult to plan. We already had floodlights at many locations and supplemented these with a large battery of lights on the water tower, plus a few on certain buildings and in the far reaches of the backyard department. Illumination now covers every foot of the fences, although to eliminate deep shadows from certain sections it was necessary to remove some shrubbery and evergreens. Steps are being taken to provide for blacking out the plant, should that be necessary.

Another precautionary protection measure is in the handling of mail. Our own messengers make three trips daily between the plant and postoffice and carry the mail in locked leather pouches. One set of keys is held by the office manager and the other is retained at the post office.

An identification photograph and pass is carried by all supervisors. Photo-badges which incorporate time-clock numbers are worn by all workers, with separate colors used for each plant. Each employe is required to show at the gate the contents of every lunch box and package he is carrying, and nothing can be taken out of the plant unless accompanied by a pass properly signed by the worker's supervisor.

Must Show Credentials

Passes must be worn by visitors all the time while in the plant. These can be signed only by one of five authorized men, and the visitor must produce credentials and evidence of citizenship before admittance.

The employment department has the responsibility of checking the history of individuals hired. Each interview is thorough, and facts are recorded carefully. Applicants must present their birth certificates or their citizenship papers and supply considerable personal information. Every man considered for employment is investigated locally and through an inquiry addressed to his last place of employment. All new workers are hired on probation for 60 days, this provision being written into our union contract.

Our health program is considered a vital part of our war production effort. The medical department in our Muskegon plants includes a head physician and surgeon who gives us three hours of his time each morning, a full-time doctor, four trained nurses, a laboratory technician, an interview clerk, and a stenographer. We also use outside consultants for eyes, for tuberculosis, and other specialized cases. One of the nurses

Don't Guess—KNOW!

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"ALNOR"

PYRO-LANCE

An Accurate Pyrometer

ANGLE OF THERMOCOUPLE ADJUSTABLE!

● Nonferrous foundrymen agree that a reliable pyrometer is indispensable for sound castings which meet rigid present-day specifications.

Pyro-Lance is the answer where rugged construction and extreme accuracy are required. It is a completely self-contained portable instrument that will outlast bare-wire styles and give true metal temperatures below the surface.

EASY TO USE!

ALNOR Enclosed-Type Thermocouples

FOR BRASS, BRONZE, AND COPPER

● Exhaustive tests have shown that "Alnor" enclosed type thermocouples are most economical based on average cost-a-reading and at the same time they give the decided advantage of true readings below the surface of the metal.

EASY TO READ!

● For ALUMINUM only, we recommend only bare wire thermocouple used with the same instrument.

SHOCK RESISTANT

WRITE FOR BOOKLET No. 1724-B

ILLINOIS TESTING LABORATORIES, INC.

418 N. La Salle Street • Chicago, Illinois

visits the home of every man absent because of sickness.

This medical program actually costs us nothing. In four years our compensation insurance rate was reduced from $3.20 per $100 of payroll to $0.88, a saving of $2.32. Since the department's total expense is $0.55 per hundred, we have a return on our investment of 4.2 to 1.

Physical examination required of each applicant is thorough. This is given after we have obtained his complete health history and includes eyes, ears, teeth, blood pressure, Kahn test, urinalysis, and chest x-ray. Because of the silicosis hazard we are particular about determining the lung condition of every applicant. We make the best x-rays obtainable, have two doctors read every negative, and they consult with a tuberculosis specialist on all dubious cases.

Our medical examinations are intended to be helpful, consequently the doctors' findings are told to every man examined. He is advised, instructed, warned, or congratulated as the case may be.

First aid, as the name applies, is first given after the damage has been done, but we regard it far more helpful to eliminate the circumstance that made the first aid necessary. Such safety work really is a combination of good housekeeping, education, and records and adequate follow-up. Safety and good housekeeping are stressed constantly, and we know we get two dollars back for every one we spend on this work.

As an aid in maintaining a clean plant, air samples are taken regularly and analyzed both qualitatively and quantitatively. The procedure used is the one outlined by the United States Public Health Service. Ross and Sehl's modified petrographic immersion method is used for determining free silica. A regular check also is made of illumination, a light meter being employed to determine when candlepower is too low. No industrial plant should be without such a meter.

Revises Apprentice Training Plan

A war emergency training plan under which apprentice graduates may secure high school as well as company diplomas upon completion of 4-year machinist, patternmaker or foundryman courses, has been instituted by Caterpillar Tractor Co., Peoria, Ill. Boys between 16 and 16½ years old who have completed two or more years of high school work may take qualifying examinations for any of the courses. The program permits boys to learn a trade without depriving them of a high school diploma, and allows the company to continue its apprentice training school, which has faced many problems since selective service was applied to boys of 18.

Frederic B. Stevens Inc., 510 Third Avenue, Detroit, is remodeling its building and installing a new laboratory.

Take Your CHOICE for cleaner CASTINGS

✓ AVON NON-SILICA PARTING *white*

✓ CLIFTON NON-SILICA PARTING *tan*

✓ OKAY NON-SILICA PARTING *pink*

✓ BUCKEYE TRIPOLI PARTING

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Our Controlled Manufacturing Process Guarantees Uniformity

EVERY BARREL UNIFORM IN QUALITY

If YOU want perfect lifts and draws, no patching of molds, higher output and lower production costs—take your choice of these favorite partings.

If YOU want clean, faultless castings that are pattern-true, with every line, curve and angle conforming precisely to the pattern, write to us for details!

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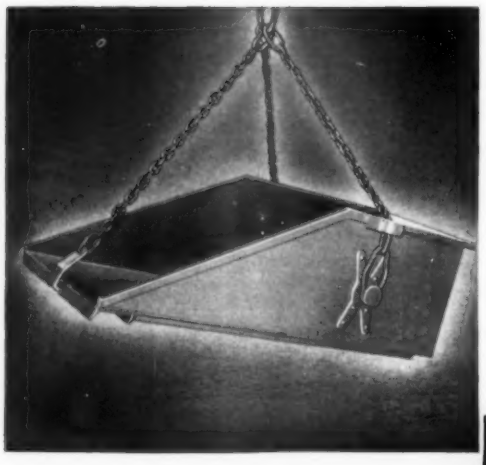

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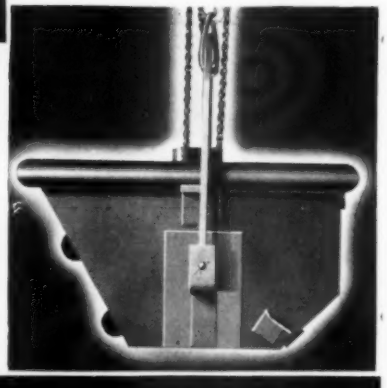
Carries up to 5 tons safely. Ejection automatic on removal front chain. This unit has met enthusiastic response from numerous foundry users.



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Capacities to 200 cu. ft. Perfectly balanced and locked in transit. Automatically ejects load and rights self by tripping locking lever. Ruggedly built.

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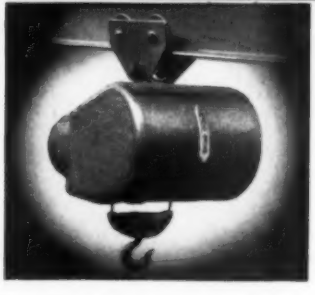

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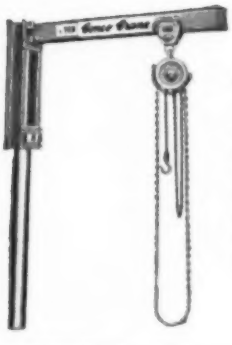
Available in 250-, 500- and 1000-lb. capacities for hook, bolt or trolley suspension. Features push button control, electric brake, positive limit switch, double drum construction. For *prompt* shipment.



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SPUR GEAR HOIST

A speedy, well-built hoist in capacities from ¼-ton through 20-tons. Excellent for foundry use in connection with various Conco light cranes and trolleys.

DIFFERENTIAL HOIST

Light weight; low cost. Pays with even occasional use. Available in ¼-, ½-, 1-, 1½- and 2-tons. With Conco I-Beam Trolley is top-flight low-cost setup.

WRITE TODAY for literature on Conco Cranes, Hoists and Trolleys for foundries. Good handling equipment speeds production.

CONCO ENGINEERING WORKS

Division of H. D. Conkey & Company 53 Grove St., Mendota, Illinois

CORE BLOWING PRACTICE

(*Continued from page* 138)

more closely the moisture must be held to 1.8 per cent.

It is logical to assume that two cores containing different amounts of moisture are not going to bake alike. If one core is baked to perfection, the other is either overheated or it retains some of the moisture contained after mixing. We realize that when molten metal comes in contact with moisture in a core surface, it causes the metal to boil. The water vapor formed is so much greater in volume than the original water that undesirable results occur. Soft cores caused by overheating in baking cannot withstand the rush of molten metal and sections are easily washed away.

Data on a core sand mixture used in core blowers for manifolds, cylinder head jackets, valves and miscellaneous cores made with and without iron oxide (Fe_2O_3) are shown in Table I. This sand is composed of the following mixture: 50 gallons of silica sand, 30 gallons of lake sand, 20 gallons of bank sand, and 7 quarts of oil; or 1 part of oil to 38 parts sand by volume. Screen test of the sand is shown in Table II. Two per cent iron oxide is used to good advantage in blower sands where the castings made with it shows an excessive number of veins or "rat tails."

Table II

Base Sand Screen Test

Mesh No.	Per Cent Remaining on Mesh
12	0.1
20	0.1
30	6.2
40	32.0
50	20.6
70	21.0
100	10.0
140	4.0
200	3.0
270	2.3
Pan	0.2
Total	99.5

A.F.A. Grain Fineness No. 51.2
A.F.A. Grain Class No. 5

Skilled help is a factor of which we cannot lose sight. Supervisors know which are their important jobs. These jobs usually require the most skilled and dependable workmen and each supervisor should always have an understudy for each of these, so that the department may continue to operate economically and at full production when any one or more of the key men drop out for any cause whatsoever. All experienced supervisors know that each core box has its own peculiar characteristics that require attention, so if skilled operators are not avail-

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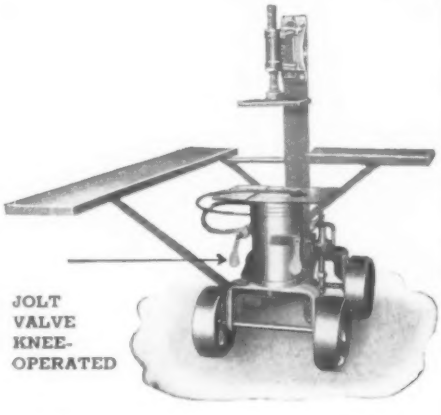

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able, the supervisor's problems have increased, particularly so in a shop where a large variety of cores are made.

We wonder how frequently core blowers are purchased with the thought in mind that any one capable of pulling a few levers can, in a very short time, be trained to become an efficient operator. Prior to the purchase of core blowers, considerable time should be spent in training efficient help, and naturally, with a sufficient number of skilled core makers, these men will prove to be the best qualified and the most skillful blower operators. Such men will also realize the importance of caring for equipment and machines, and quickly notice slight defects in equipment and report them to the supervisors before they require costly repairs. Experienced core makers also take considerable pride in the quality of their work and are able to assume a reasonable amount of responsibility for their own safety.

Co-operation Is Essential

Of the many management factors involved, the one considered most important, in fact essential, is co-operation. This factor covers a wide scope; every department in the organization is in some way involved. There are numerous ways in which the molding departments, pattern shop and cleaning room can contribute in simplifying and making core blowing more economical. To mention briefly a few, gating in some cases can be successfully changed to accommodate the core room; patterns can be turned over, making the original cope the drag. It is also economical at times not to plug impressions left by wire and rod stools as the metal that forms in these impressions can readily be removed in the cleaning room by the sweep of a hammer.

The pattern shop supervision can, of course, appreciate the core room's problems. Being so closely associated with the core department, it can anticipate the difficulties that are often encountered, particularly with new core equipment, and pattern shop supervision can, in many cases, discuss these with the engineering division and obtain changes to overcome the difficulties.

The results of pattern shop interest in one of these cases is illustrated in Fig. 4. It is apparent in this example that the engineering division had specified two cored holes in the casting to be made from equipment at the right on the top shelf. Two core prints were provided for in the dryer. Pattern shop supervision, realizing the difficulties that would be encountered with these prints on a core as bulky as this, conferred with the proper authorities, with the result that the holes were removed. These holes are now drilled instead of being cored out. Blowing of the prints, wiring, care in stacking and transporting have all been eliminated. This example also brings out the fact that core boxes containing several loose pieces can be successfully blown.

It is not our intention to present any hard and fast rules, which must be practiced when blowing cores. The amount

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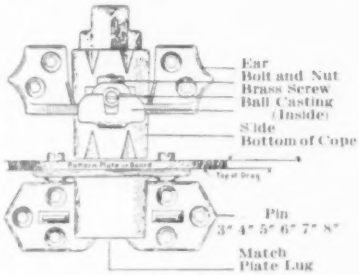

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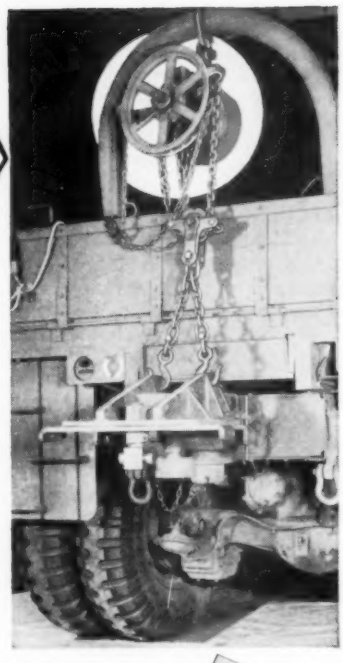

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of air pressure available in any foundry, for instance, will determine the number of vents, blow holes, and their sizes. Sand-drying facilities will also, to some extent, be a determining factor. It has been our experience that, although there are certain fundamentals or basic principles to which we should adhere, the supervisor should possess and exercise good imagination and ingenuity.

It is only natural that in the course of time we do encounter numerous core boxes with a striking similarity. In these cases, our basic principles can be applied. In most cases, however, each box or set of boxes to be rigged presents a different problem.

Equipment that has served for years on some machine or bench, can be and, in many cases successfully, has been rigged for blowing, but the fact still remains that equipment can best be rigged for quality and quantity if thought is given, starting with the blueprint, in planning for core blowing. Then the probable location of vents and blow holes is anticipated, proper handling facilities are provided and core box weights controlled.

The writer does not intend to describe in detail the mechanical functions of a core blower, but for the benefit of those who are not familiar with them some illustrations are presented. In Fig. 5 there is shown at *A* the sand reservoir or magazine, as it is commonly referred to in many shops. Plates in these pictures are referred to as "magazine plates." The five plates in this figure and one shown at *B* in Fig. 8 serve for approximately one thousand different core boxes of all shapes and sizes.

Make Many Changes

The method used to make frequent changes with a minimum of lost time is illustrated in Fig. 6. Upper halves of three core boxes are shown bolted to the magazine plate, and two sets of loose pieces on the other two. It should be noticed that these core boxes are almost identical. They are made to be adaptable to either plate. The machine on which these cores are made depends entirely upon schedule requirements.

The core box, attached to a $\frac{3}{8}$-in. steel plate, is placed underneath the rails of the magazine slot, sliding in from either end. The core box is located in the center and sealed against the magazine plate by drawing up the bolts. The number of bolts used depends entirely on the length of the core. The plate to which the box is attached should overlap the opening in the magazine plate at least 1-inch for the best results.

The sixth blow plate, shown at *B*, Fig. 8, is always used as a master plate on large core blowers. This plate has approximately 730 holes. One-half of these are $\frac{5}{8}$-inch and the others $\frac{1}{2}$-inch diameter. It is not difficult to realize that when large core boxes are rigged for blowing machines, the holes in the box will correspond with some holes in the plate closely enough to obtain good results, thus eliminating the necessity of

making individual plates. This illustration brings out the fact that when core boxes are considered too large for a small blower, and not large enough for a large one, two such core boxes can be fastened to a single plate and run on a large blower. It is evident that the drawing and replacing of loose pieces and of the upper half of the core box by hand are entirely eliminated.

In Fig. 7, the magazine *A*, the magazine plate *B*, the blow plate *C*, the upper halves of core boxes *D*, and all loose pieces are assembled as one unit. Lower halves of the boxes are located on the machine table directly underneath the upper halves. Air is then released into the clamp diaphragm, which raises the draw table. This, in turn, forces the throat of the magazine against a sealing ring directly under the blow valve. The valve is next released and the blow completed, that is providing all joints are properly sealed and the core box area does not exceed that of the piston in the draw table.

Two completed cores shown in Fig. 3 do not even resemble one another. This two-box practice is followed only when both cores are to be used for one and the same casting. It is not advisable to rig boxes for the purpose of running them together unless production requirements warrant it.

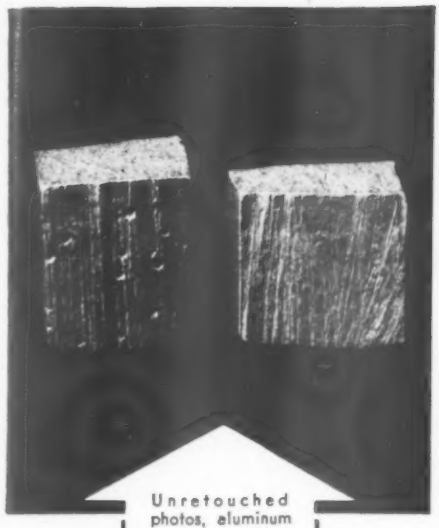
Complete sequence of operations on one of the large blowers is shown in Fig. 2. After the core *C* is blown at *A*, it proceeds along on the conveyor to the roll-over machine *B*, where the roll-over and drawing are completed. Cores are removed to the baking ovens while the boxes return to the blower on the conveyor *D* in the background, where the boxes are blown out, wired and the loose pieces replaced. The operation of blowing these cores is then repeated in proper sequence.

(To be concluded next month)

Crane, Hoist Safety Code Issued

A new safety code for cranes, derricks and hoists has been completed by the American Standards Association, 29 West Thirty-ninth Street, New York. The code applies to the construction, installation, inspection, maintenance and operation of cranes and derricks; to their runways, to simple drum hoists; to overhead electric hoists and their runways; to overhead air hoists; and to hand-powered derricks.

It does not apply to hoisting machines with capacity under 1 ton, or to the temporary use of units on construction work or to special equipment for mines, etc. The 90-page booklet includes construction details, definitions and diagrams for each type of crane; safe working loads for chains; qualifications and rules for operators and standard operating signals. Copies may be obtained from the association at $1.50 a copy.



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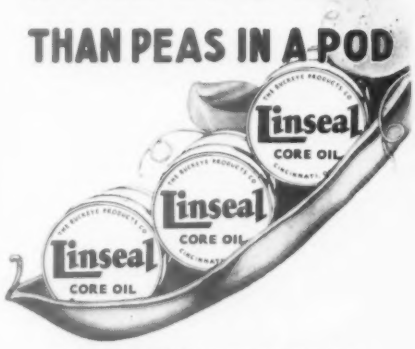

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STEEL SHEAVES ARE CAST CENTRIFUGALLY

(*Continued from page* 141)

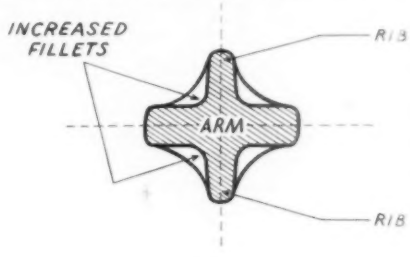
trifuging aiding metal to flow. Centrifuging also prevents cold shuts or wrinkles. The absence of wrinkles on surface of castings adds greatly to the appearance, from a customer viewpoint.

Centrifuging during pouring serves another important purpose; it causes metal to flow immediately to the outside of the mold cavity. Fig. 8 shows sheave poured short. Note that all of the metal which entered mold went to the outside, and being the first metal in the mold chilled first. The last metal to enter was in the center of mold and gate, where it should be, thus greatly aiding directional solidification, which is just as important in producing sound centrifugally cast castings as in the conventional static practice.

Therefore, it is necessary to analyze each job before attempting to make it, in order to ascertain whether or not it can be produced satisfactorily. In the case of sheaves, there are various types—spoke, solid web, and web with holes. The spoke type, with light metal section in spokes and heavier metal around the groove, requires that the metal section of the spoke be increased, and this usually can be done by increasing the radius of the fillets. Fig. 12 shows increased metal in spoke.

The web type also usually has thin metal in the web, so feeder pads generally of a half-round shape, on both sides of web running from hub to groove section, will produce solid groove metal. Fig. 13 shows feeder pads.

Sheaves with small diameter cored through hub are generally cast solid, so as to better feed through spoke or web



SECTION THRU ARM

Fig. 12—Method of increasing metal in spoke

to rim. Medium-size sheaves with hub diameter up to 5 or 6 inches are cast with one ingate. Larger ones with increased hub diameter are cast with two or more ingates. Fig. 1 shows various gating arrangements.

In static practice, it is customary to put feed heads around the rim to assure sound metal in the groove. This causes a variation in rim temperature, resulting

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n warpage and, very often, cracks. Fig. 3 shows both static and centrifugal casting methods. It also shows a crack in rim of the casting poured statically. This does not happen when sheaves are centrifugally cast, due, as mentioned previously, to the fact that the first metal which enters flows to the rim and cools uniformly.

Cleaning costs are reduced materially, resulting in a sheave greatly improved in appearance being shipped to

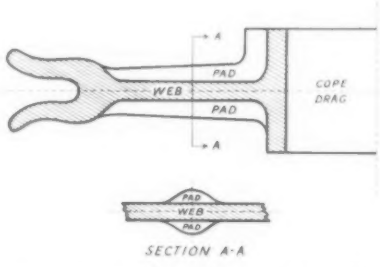

Fig. 13—Feeder pads on thin webs

customer. Good appearance in castings is one thing in which all users of steel castings are interested.

The other outstanding advantages in centrifugally cast sheaves is an increase in yield from 60 to 80 per cent, over the statically cast, taking in consideration, of course, that heads are used in static practice.

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Book Review

Industrial Radiology, by Ancel St. John and H. R. Isenburger, cloth, 298 pages, 6 x 9 inches, 151 illustrations, published by John Wiley & Sons Inc., 440 Fourth Avenue, New York. Price $4.

This is a second edition by these authors, the previous one, *Industrial Radiography*, having been brought up to date by inclusion of developments of the past nine years and the title changed to indicate treatment of both radiography and fluoroscopy. The book is for practical use by the engineer, the shop man and the student. Details are explained in simple language, theoretical data being given only when it will define a practical point. It tells the uses of radiology, what equipment is necessary and how it is operated, and describes various applications of radiology for industrial inspection. Operating and cost data are incorporated, and a comprehensive bibliography is appended. Separate chapters discuss radiography of large castings and forgings, of welded vessels and structures, and of small objects. Industrial fluoroscopy and use of radium are described in detail. The book also gives instructions for interpreting radiographs and lists radiographic specifications and rules. Illustrations are used liberally.

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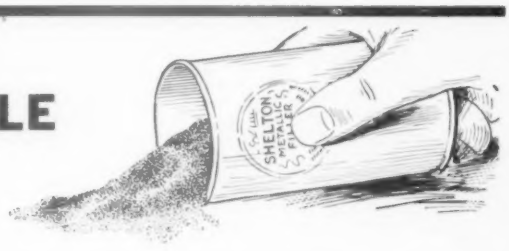

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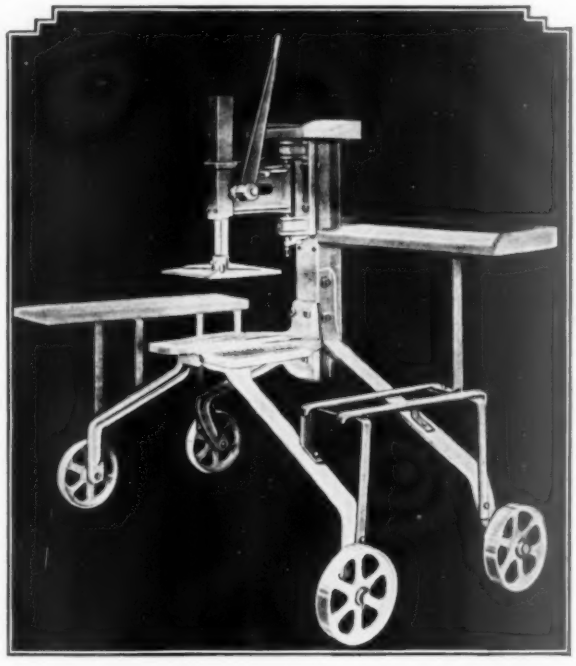

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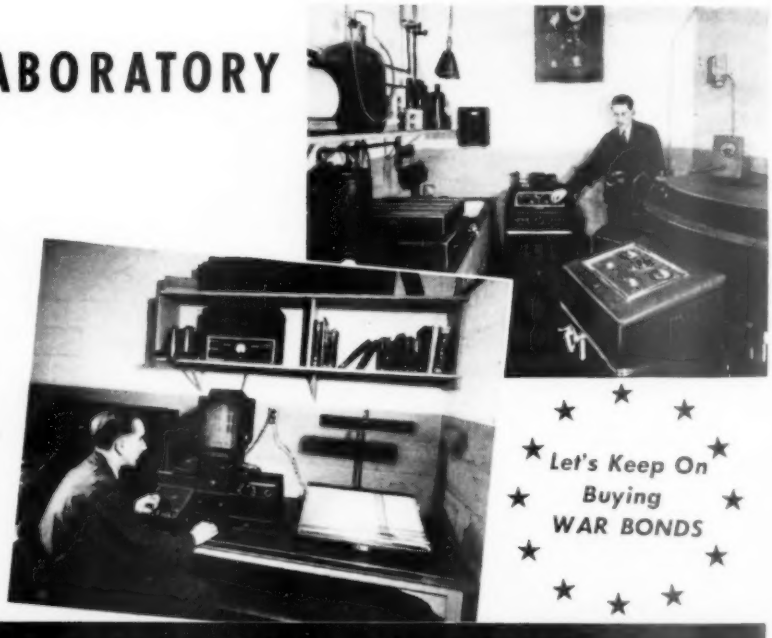

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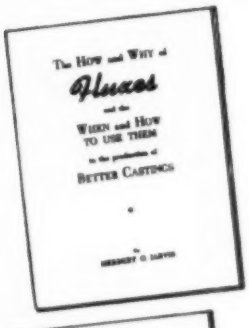

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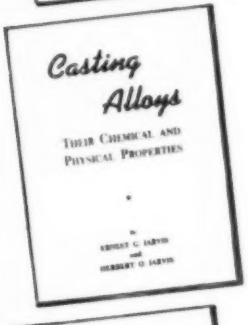

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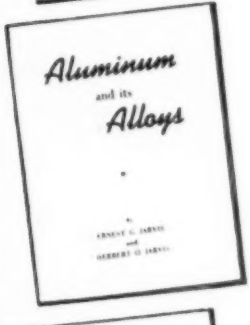

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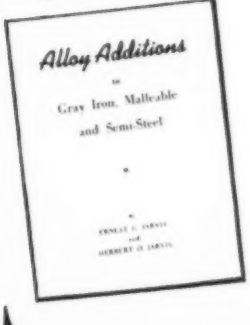

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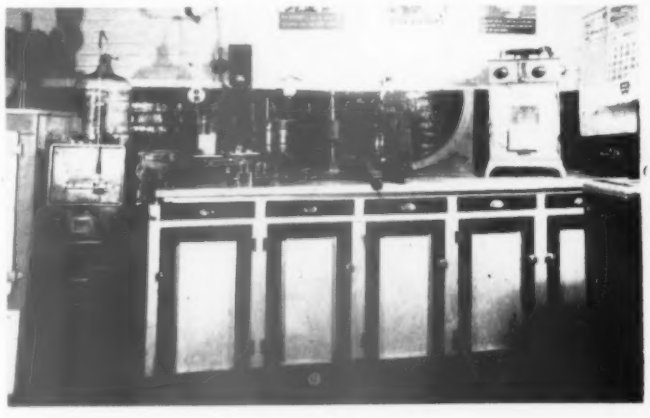

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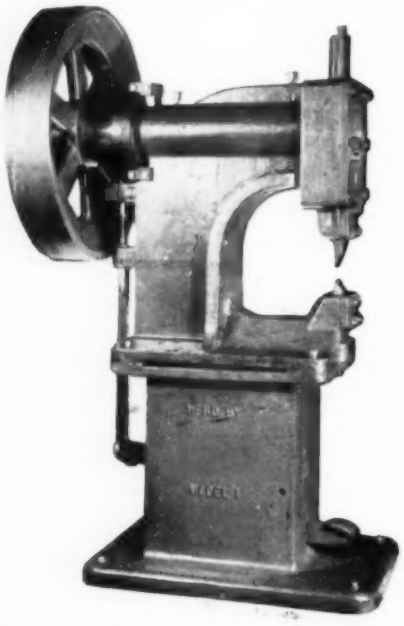

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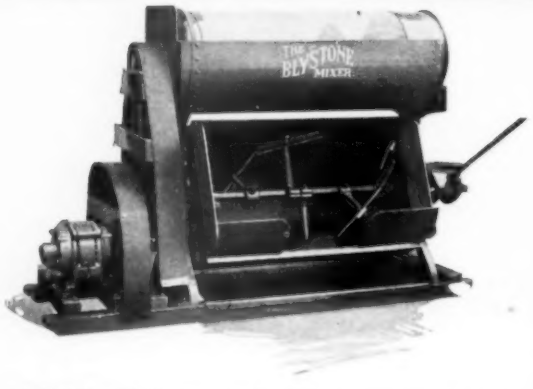

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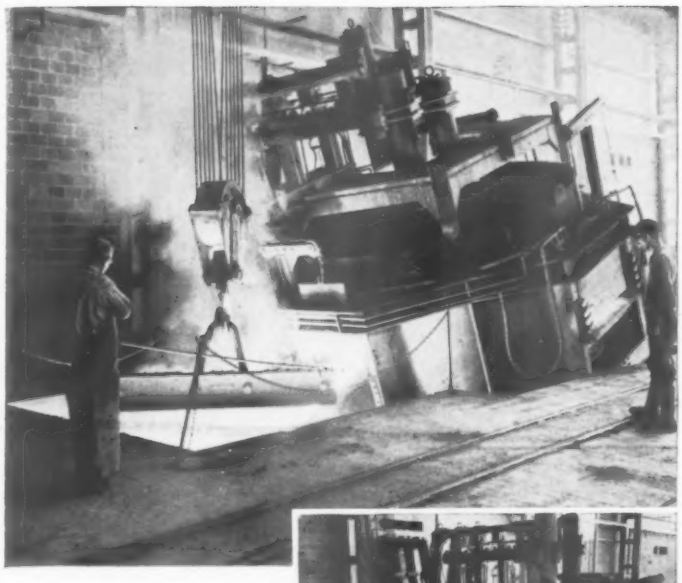

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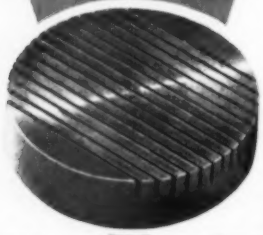

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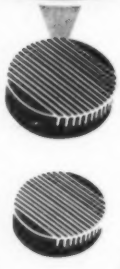

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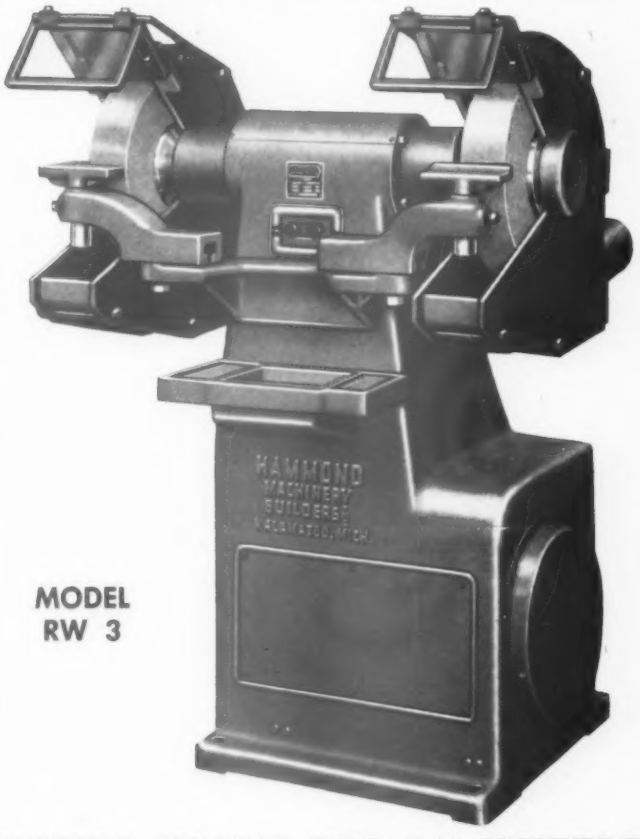

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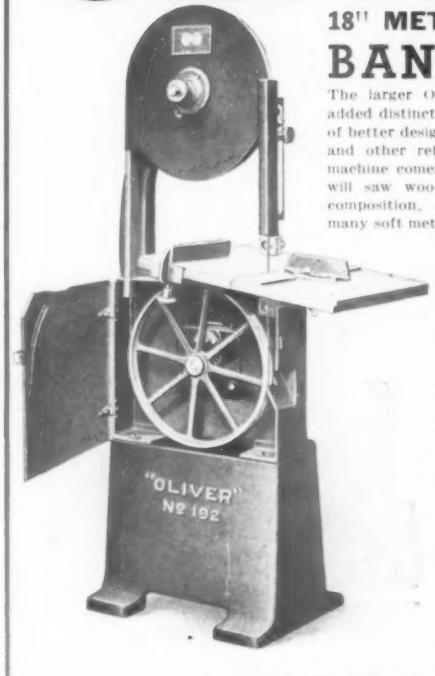

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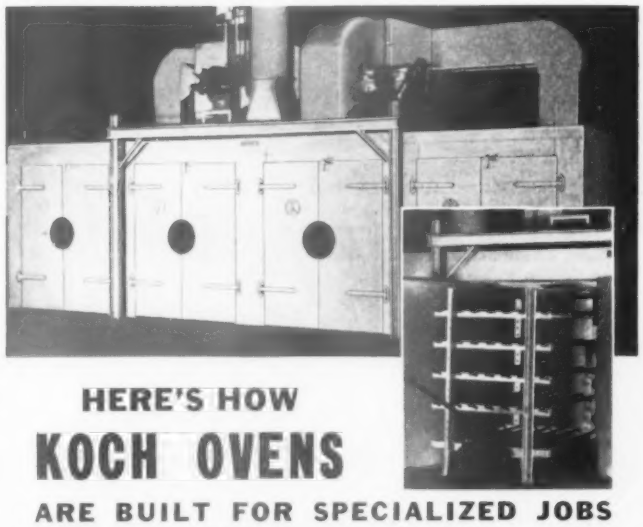

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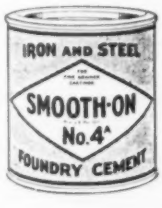

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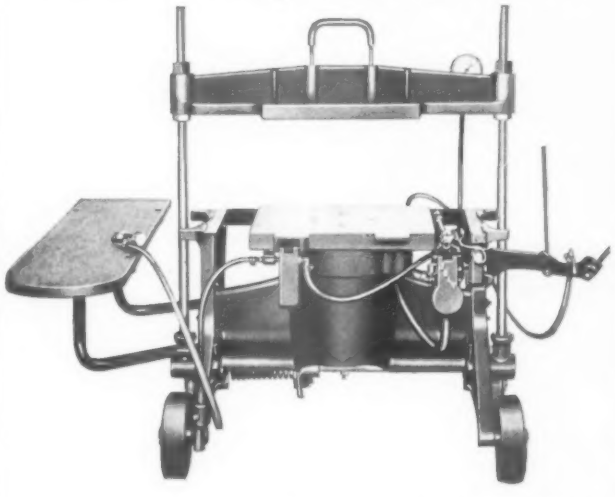

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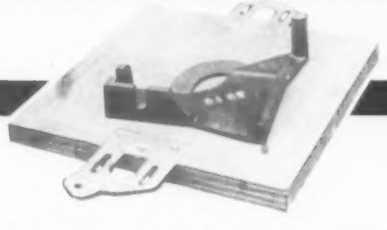

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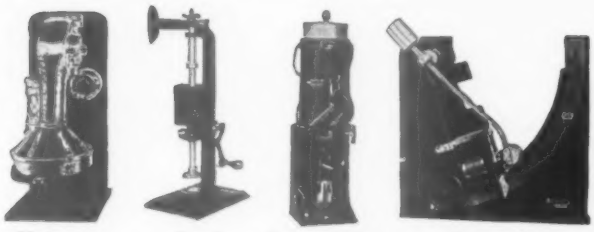

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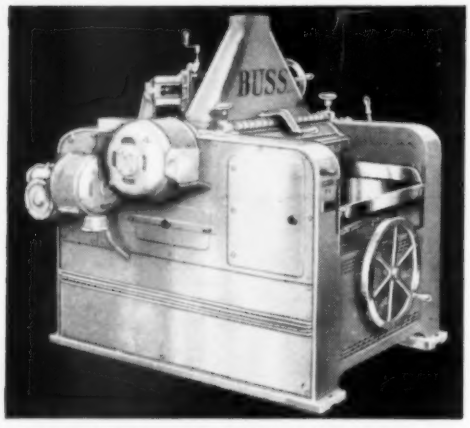

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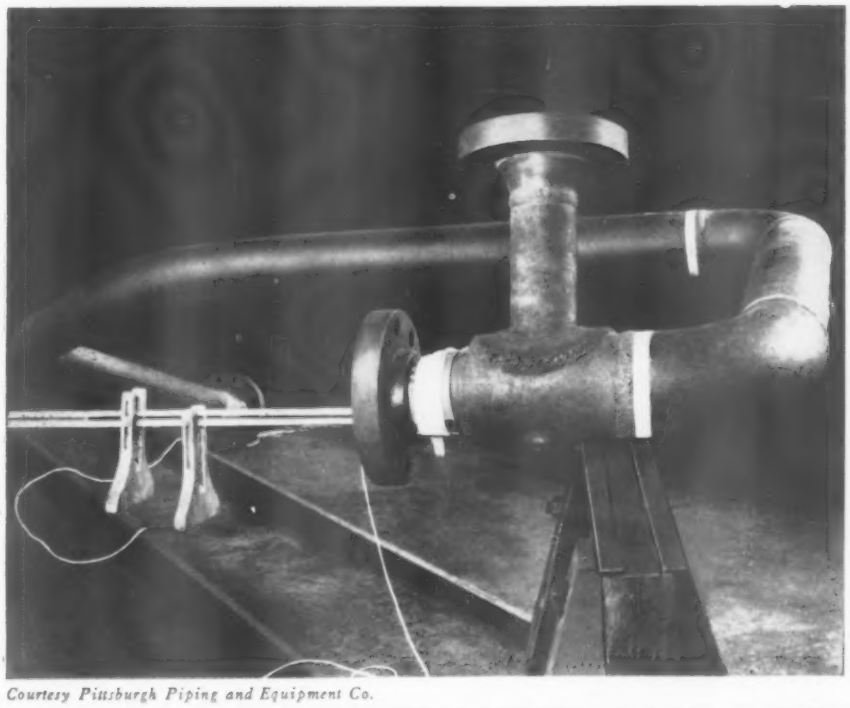

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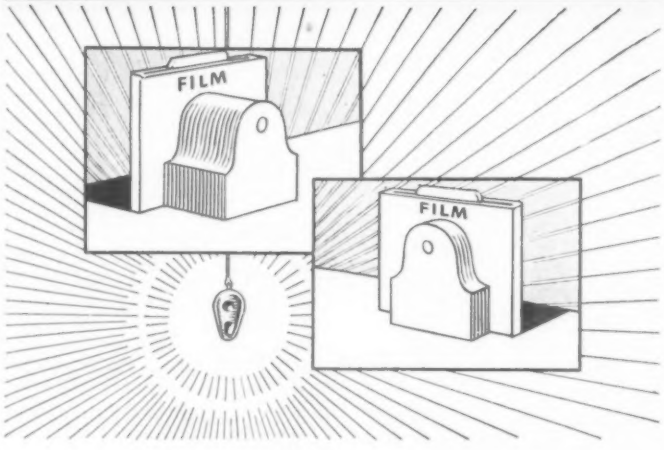

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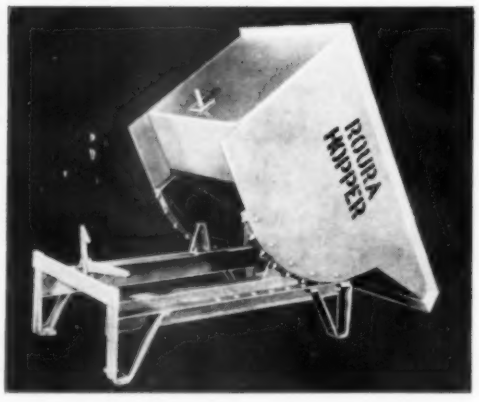

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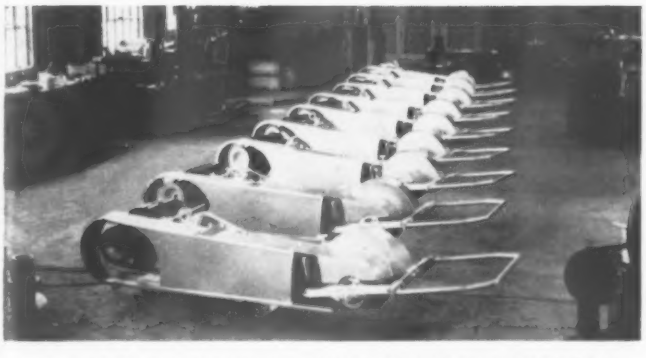

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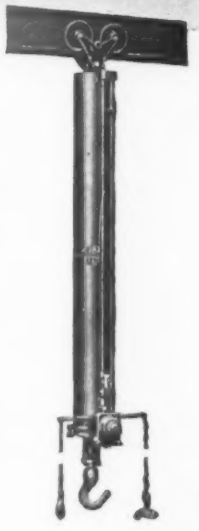

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1. When running a new air supply line, or relocating an old one, be sure to blow out all grit, rust, and chips before connecting to the hoist.
2. Do not install hoists close to an open furnace or other source of heat without shielding, otherwise piston leather may char or lubricant dry out.
3. For smooth operation and long life, put one-half pint of heavy cylinder oil into the cylinder through the oil plug in rear head every 30 days. This keeps piston leather soft and prevents air leakage.
4. If piston jumps or jerks, it indicates improper oiling or binding of rod stuffing box. Keep stuffing box leak-tight only.
5. Fill oil cup on valve every 30 days. This admits two drops of oil every time hoist valve is operated.
6. Drain off any condensation in cylinder periodically through drain plug in lower head.
7. Check valve disc and seat occasionally to prevent wear from grit or dirt in air line. A worn valve causes "creeping" and loss of efficiency.
8. By keeping hoists and cylinders clean, properly lubricated, and by replacing broken or worn out parts now, you can increase the efficiency and long life of your equipment and prevent production shutdowns in the future.

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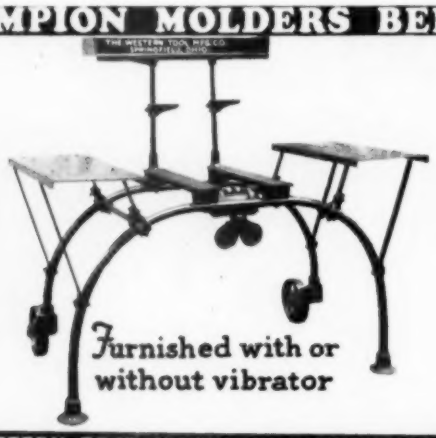

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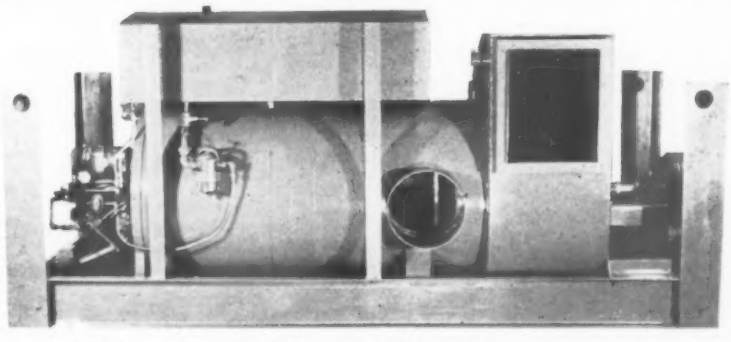

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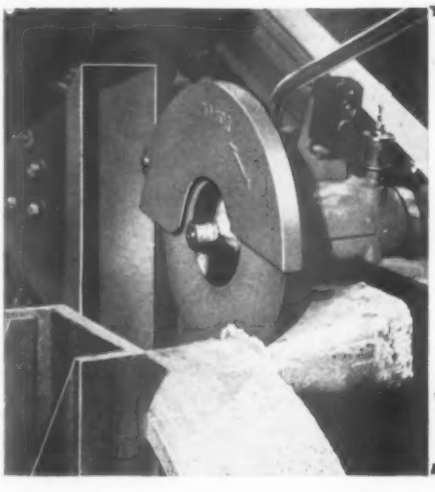

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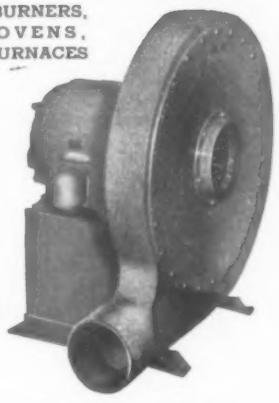

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3/8"	1/2" x 7/8"	No. 18 "
7/16"	1/2" x 7/8"	No. 18 "
1/2"	5/8" x 7/8"	No. 18 "
9/16"	5/8" x 7/8"	No. 16 "
5/8"	3/4" x 7/8"	No. 16 "
3/4"	7/8" x 1"	No. 16 "
7/8"	7/8" x 7/8"	No. 16 "
1"	1" x 1 1/8"	No. 15 "
1 1/8"	1 1/8" x 1 1/8"	No. 15 "
1 1/4"	1 1/4" x 1 3/8"	No. 13 "
1 3/8"	1 3/8" x 1 3/8"	No. 13 "
1 1/2"	1 1/2" x 1 5/8"	No. 12 "
1 5/8"	1 5/8" x 1 5/8"	No. 12 "
1 3/4"	1 3/4" x 1 5/8"	No. 12 "
1 7/8"	1 7/8" x 1 7/8"	No. 11 "
2"	2" x 1 7/8"	No. 11 "

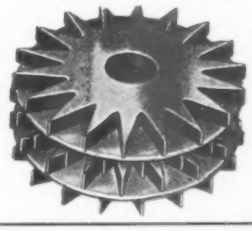
●

WRITE FOR WORKING SAMPLES AND PRICES

THE ONE-PIECE CHAPLET CO.
4001 ASHLAND STREET PHILADELPHIA, PENNSYLVANIA

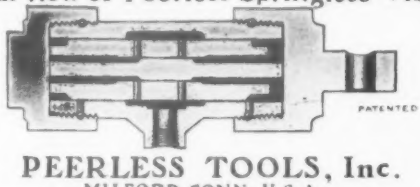
Grinding Wheel Dressers

■ We manufacture the only complete line of dressers and cutters. Write for copy of catalog "F" and name of your nearest dealer.



DESMOND-STEPHAN MFG. CO.
Urbana, Ohio
Canadian D. S. Mfg. Co., Hamilton, Ont.

Sectional view of Peerless Springless Vibrators



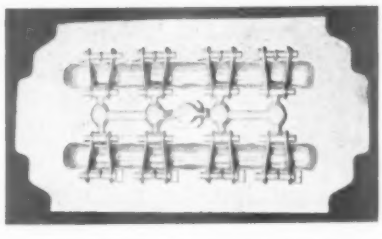
PEERLESS TOOLS, Inc.
MILFORD, CONN. U.S.A.

WILLIAMS "HOOK-ON" SINGLE LINE BUCKET

The Williams "Hook-on" Single Line Bucket is designed especially for foundry service in 3/8 to 2 cubic yard capacities. Its many features of design and construction are described in an illustrated bulletin sent free on request. Write

SPECIAL TYPE for FOUNDRY SERVICE

THE WELLMAN ENGINEERING CO. • CLEVELAND, OHIO



Quality Precision Pressure-Cast Plates
Cope and Drag Plates · Multiple Core Boxes
MANY YEARS EXPERIENCE IN THIS FIELD
Ask for List of Satisfied Customers—Write for Details

PLASTER PROCESS CASTINGS CO.
6922 Carnegie Ave.—Cleveland, O.

BERKSHIRE Jolt Squeeze MOLDING MACHINES

Model H Jolt Squeeze

CANNON AIR VIBRATORS

10" SQUEEZE CYLINDER

4" JOLT CYLINDER

CANNON VIBRATOR CO. • 1111 Power Ave. Cleveland, Ohio • **BERKSHIRE MFG. CO.**

Classified Advertising

Help Wanted

WANTED

Metallurgist, with malleable and steel experience preferred. The man we are looking for is young and aggressive; a thorough investigator; with a liking for research and development of malleable and steel alloys. His growth will be limited only by his ability and diligence. His duties would be supervising metallurgical control of malleable and steel castings, and in the development and control of their alloys. Old, well-established foundry in Western New York State. Give age, photo, draft status, and record, in first letter. Interview will be arranged. Starting salary $350.00 monthly. If now engaged in war work, at full skill, please do not apply.

ADDRESS BOX 130 The FOUNDRY
CLEVELAND, O.

SUPERINTENDENT

For large malleable foundry. Good opportunity for one who can demonstrate real ability. If your application is to receive full consideration, it must give complete details as to business connections, exact duties, references, age, draft status, salary expected, and how soon available.

ADDRESS: BOX 132 The FOUNDRY
CLEVELAND, OHIO

FOUNDRY SUPERINTENDENT AND PLANT MANAGER

To take charge of aluminum foundry with 500 employees. Must be familiar with modern production equipment and must know how to handle men. Knowledge of aluminum is not important.
Plant 100% on war work for aircraft but position is permanent for man with required ability to run the job.
Replies will be received by the company's president and will be held in complete confidence. No inquiries will be made before interview nor without permission of applicant.

ADDRESS: BOX 149, The FOUNDRY, CLEVELAND

FURNACE FOREMAN (BRASS)

Due to increased production of war materials, largest smelter in Middle West is increasing its staff. Permanent position open for secondary brass reverberatory furnace foreman. State full qualifications in first letter. Address: Box 986, The FOUNDRY, Cleveland.

FURNACE FOREMAN (ALUMINUM)

Largest smelter in Middle West is looking for secondary aluminum foreman for reverberatory furnaces. Permanent position. 100% war work. State full qualifications in first letter. Address: Box 985, The FOUNDRY, Cleveland.

COREROOM FOREMAN

Experienced in Malleable Iron. Must be experienced in sand formulas and setting of Piece Prices. State experience, references and salary expected in first letter. Address: Box 134, The FOUNDRY, Cleveland.

DEMONSTRATOR SALESMAN

Experienced in application of Core and Mold Washes and General Foundry Practice. North Atlantic States. Address: Box 991, The FOUNDRY, Cleveland.

FOUNDRY FOREMAN

Experienced, for medium size foundry. State age, experience, family status and salary expected in first letter. Address: Challenge Co., Batavia, Ill.

Help Wanted

ADVERTISING MANAGER WANTED

To take complete charge of a publicity-educational program including preparation and/or procurement of technical articles on adaptation of gray iron, and be familiar with advertising and pamphlet layout. Please submit full personal record including salary expected. Address: Box 118, The FOUNDRY, Cleveland.

MALLEABLE FOUNDRYMAN

To act as assistant foreman foundry department. (Approximately 150 molders). Must know gating, rigging and production conveyor molding. Give experience, references and age. This is a permanent position. Address: Box 961, The FOUNDRY, Cleveland.

ATTENTION SALESMEN!

Representatives now calling on foundries regularly are wanted by a well-known manufacturer of high grade line of plumbago, facings, parting, blacking, core wash and allied foundry items. Liberal commission basis. Please advise territory covered, lines now handled, experience with foundry items, etc. Address Box 217, The FOUNDRY, Cleveland.

STEEL FOUNDRY MANAGER

OPPORTUNITY FOR AN EXPERIENCED PRACTICAL FOUNDRYMAN WITH AT LEAST 20 YEARS' SHOP EXPERIENCE TO TAKE CHARGE OF ALL OPERATIONS IN A STEEL FOUNDRY LOCATED IN NORTHERN OHIO. MUST HAVE WORKING KNOWLEDGE OF ALL DEPARTMENTS AND BE ABLE TO TRAIN MEN. PRESENT MANAGER DESIRES TO WITHDRAW. RIGHT MAN TO BECOME OFFICIAL IN THE COMPANY. PRESENT CAPACITY 600 TONS LIGHT STEEL CASTINGS. IN REPLY STATE ALL DETAILS. EXPERIENCE, SALARY DESIRED, PERSONAL CONDITIONS. ADDRESS: **BOX 147, THE FOUNDRY, CLEVELAND.**

NONFERROUS METALLURGIST

America is at War! Due to the war program we have found it necessary to increase our production facilities and our staff. We have an opening for a nonferrous metallurgist. State full qualifications in first letter. Largest smelter in the Middle West engaged in 100% War Work. Address: Box 987, The FOUNDRY, Cleveland.

GRAY IRON FOUNDRY FOREMAN

Jobbing and machinery; medium and heavy. Experienced on cupola, rigging and iron mixes. Give age, education, salary, former employers. Address: Box 131, The FOUNDRY, Cleveland.

SALESMAN IRON FOUNDRY

To solicit orders for grey iron castings 5 lbs. to 5000 lbs. each. Must have knowledge of costs and be able to quote prices. Foundry capacity 20 tons daily. Should have some following in or near Philadelphia, Penna. Address: Box 138, The FOUNDRY, Cleveland.

WANTED

Foundry foreman or foundry superintendent for old established Midwestern malleable iron foundry. Melting 115 tons daily — 100% war work. Permanent. Address: Box 128, The FOUNDRY, Cleveland.

WANTED

Steel and gray iron molders
Union shop

N. & S. FOUNDRY COMPANY, SEATTLE, WASH.

COREMAKER FOREMAN

Thoroughly familiar with light and medium-heavy work. Address: Box 983, The FOUNDRY, Cleveland.

METALLURGIST WANTED

Who has had ferrous foundry experience to take charge of melting operations. New Jersey location. Address: Box 142, The FOUNDRY, Cleveland.

Positions Wanted

PLANT MANAGER

A man thoroughly experienced in all phases of the gray iron foundry industry wishes to make a profitable connection which will have post-war possibilities. Preferably with a medium size organization in the East. Can furnish excellent recommendations and references. Address Box 110, The FOUNDRY, Cleveland.

FOUNDRY SUPERINTENDENT OR GENERAL FOREMAN

Age 43, married, know rigging, gating and heading. Practical electric furnace operator. Can handle help. Steel or nonferrous. Address: Box 117, The FOUNDRY, Cleveland.

MANUFACTURERS' REPRESENTATIVE AVAILABLE

Established manufacturers' agent is seeking account to represent on commission basis in automotive industry. Primarily interested in production items used in trucks, aircraft, automobiles. Best of references. Technical education. Address: Box 984, The FOUNDRY, Cleveland.

GRAY IRON FOUNDRY SUPERINTENDENT

Twenty years' experience as foreman and superintendent. Technical trained. Heavy and light jobbing work. Green, dry sand and loam, machinery and high pressure castings. Correct cupola practice for production of high strength iron. Now employed but wish to change to more essential work and a future after the war. Address: Box 995, The FOUNDRY, Cleveland.

FOUNDRY MANAGER—METALLURGIST

Twenty-two years' experience in jobbing and production foundries—gray, high strength alloy cast iron, aluminum cupola malleable. Experienced in all foundry departments, costing, selling. Now operating a foundry. Age 47, married, graduate metallurgist. Prefer light alloy field. Address: Box 143, The FOUNDRY, Cleveland.

EXPERIENCED FOUNDRYMAN

Technical engineering graduate, age fifty and experienced in all phases gray iron practice, estimating, production, and sales. Especially good on design molding machine rigging. Minimum salary six thousand. Address: Box 144, The FOUNDRY, Cleveland.

FOUNDRY MANAGER OR SUPERINTENDENT

Thorough knowledge of gray iron, semi-steel, and aluminum; mixing by analysis; and all alloys. Experienced in light, medium, and heavy work; pit-molding; sand slingers; rigging for squeezers; molding machines; and training men for maximum production. Reference. Address: Box 944, The FOUNDRY, Cleveland.

FOUNDRY FOREMAN OR SUPERINTENDENT

Aggressive foundry foreman desires permanent connection. Fifteen years practical foundry experience, five on supervision. Can handle small aluminum and bronze sand foundry, do own rigging etc., also squeezer molding in aluminum or iron. Ability to handle men excellent. Age 36. Address: Box 141, The FOUNDRY, Cleveland.

FOUNDRY CHEMIST and METALLURGIST

Over draft age. Broad experience in gray iron, malleable and nonferrous foundries. Chicago district location preferred. Address: Box 146, The FOUNDRY, Cleveland

PRACTICAL FOUNDRYMAN

With experience in steel, gray iron, semi-steel and alloy castings, is open for position as Superintendent or General Foreman. Best of references. Address Box 885, The FOUNDRY, Cleveland.

FOUNDRYMAN

With over 20 years' experience in gray iron and semi-steel desires position as foreman in gray iron foundry. Practical experience as molder and foreman. McLain graduate. Best reference. Address: Box 145, The FOUNDRY, Cleveland.

Classified Advertising

Positions Wanted

FOUNDRY SUPERINTENDENT

Twenty-five years of experience in all phases of the industry. Metallurgical training. Have operated both batch melting and duplex melting foundries. Address: Box 123, The FOUNDRY, Cleveland.

ENGINEERING SERVICE

If your production is low and your loss high, if you feel that general inefficiency prevails in your foundry, let me explain an inexpensive method. Address: Box 959, The FOUNDRY, Cleveland.

FOUNDRY MANAGER & METALLURGICAL ENGINEER GRADUATE—FIRST CLASS

Twenty-five years' experience in all phases of foundry operations in Steel, Gray Iron and Non-Ferrous Metals, desires change with firmly established concern where his executive ability can be fully used and remunerated. Age 46. Address: Box 113, The FOUNDRY, Cleveland.

FOUNDRY SUPERINTENDENT

Active, energetic, practical man, 30 years' experience all phases Gray Iron practice, small or large castings, desires position with progressive concern. Last 12 years superintendent. Best references. Willing to go anywhere. West coast preferred. Address Box 140, The FOUNDRY, Cleveland.

PRACTICAL FOUNDRYMAN

Eighteen years' experience medium size gray iron, steel castings. Eight years as foreman in high production shops. Understand rigging, gating, bidding on work. Experienced teaching new moulders. Age 40. Go any place. Ambitious, looking for a future. Address: Box 125, The FOUNDRY, Cleveland.

FOUNDRY FOREMAN

A medium sized efficient Iron Foundry Foreman desires work. Is free to go any place in the country. Address: Box 115, The FOUNDRY, Cleveland.

FOUNDRY SUPERINTENDENT OR MANAGER

Forty years' practical and technical experience in all lines and metals. Sixty years of age. Can manage and handle men successfully. Active and energetic. Prefer Middle West Coast. Address: Box 101, The FOUNDRY, Cleveland.

EXPERIENCED FOUNDRYMAN

Offers 20 years' experience in selling and demonstrating supplies, equipment, binders specialty. Moderate salary. No commission. Address: Box 758, The FOUNDRY, Cleveland.

FOUNDRY SUPERINTENDENT

Practical gray iron foundryman, age 44, technically trained, graduate metallurgist; with 23 years' broad experience producing quality castings in machine tool, general jobbing and high production. Well-versed in green and dry sand, cupola, rigging for machines, coremaking, and working from blue prints. Desires to make connection with reliable foundry in New England or East. Address: Box 910, The FOUNDRY, Cleveland.

FOUNDRY EXECUTIVE-METALLURGIST

Twenty-five years' experience in light and medium gray iron and alloys. Technical and practical training. Excellent record and references. Specializing in organizing for production at lowest costs. Age 50. Interested in position where complete responsibility is required. Address Box 133, The FOUNDRY, Cleveland.

Positions Wanted

SUPERINTENDENT

Malleable foundry. Twenty-five years' experience. Practical man in all departments. Technical education. Very aggressive. Address: Box 139, The FOUNDRY, Cleveland.

Employment Service

GRAY IRON FOUNDRY EMPLOYMENT

We are receiving many inquiries for superintendents, metallurgists and foremen. We shall be glad to hear from qualified men. No charge.

Gray Iron Founders' Society Inc.
1010 Public Square Building Cleveland, Ohio

SALARIED POSITIONS

This advertising service of 33 years' recognized standing negotiates for high salaried supervisory, technical and executive positions. Procedure will be individualized to your personal requirements and will not conflict with Manpower Commission. Retaining fee protected by refund provision. Identity covered and present position protected. Send for details.

R. W. BIXBY INC.
101 Delward Bldg. Buffalo, N. Y.

Wanted-To-Buy

WANTED AT ONCE

One 36" Barrett Cupola, with Blower, Motor, and Starter, complete, for 220 volt, 2-phase, 60-cycle current. Address full particulars to:

Box 105 The FOUNDRY
Cleveland

WANTED

6,000 C. F. M., 16-20 oz. centrifugal cupola blower direct connected to motor. Motor specifi. 3/60/440.

ST. PAUL ENGINEERING & MANUFACTURING CO.
FORMERLY ST. PAUL FOUNDRY
500 COMO AVENUE ST. PAUL, MINN.

MIXERS WANTED

Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price for immediate acceptance. Address Box 578, The FOUNDRY, Cleveland.

WANTED

Ingot mold conveyor. Small ingot size. Give price and capacity. Address: Box 137, The FOUNDRY, Cleveland.

WANTED

Will buy several No. 433 Osborn molding machines. Write or call Frank Foundries Corp., Moline, Ill.

WANTED

Cupola blower to deliver 1000 cu. ft. per minute at 8 ounces pressure. Motoblower or weighted air equipment preferred. Address: Fords Foundry Co., Fords, N. J.

WANTED
The following used equipment

A 36" x 42" American Foundry Equipment Company Wheelabrator Tum Blast OR Pangborn No. 14 type "GK" Rotoblast, with or without loading device, but complete with ventilating and dust collector; 1—2000 pound, gear operated reservoir ladle; 1—heavy duty double end snagging grinder, direct connected motor drive—220 V-3 phase—60 cycle capacity 16 x 3 x 1½, wheels. Greater capacity would be considered. We want good used or rebuilt equipment. Equipment must be in first class condition. Call or write Kelly Foundry & Machine Co., Elkins, West Virginia. Phone 90.

Wanted-To-Buy

WANTED

Small non-ferrous foundry. In operation or with equipment intact. State price and terms, value of sales last year, also pounds of brass, bronze and aluminum castings produced in same period, if unionized, size and construction of buildings, if on railroad siding. List all equipment, length of time in business, land available for expansion, company and personal references, number of employees, and if any machinery facilities are available. Address Box 148, The FOUNDRY, Cleveland.

Foundry for Sale

Foundry equipped to make castings from 25 lbs. to 20000 lbs. Foundry building constructed of Brick, Steel & Concrete with Asbestos Sheet Roof. Three story brick pattern storage building. One city block of property with side-track. Now working. Located in Eastern Ohio. Address: Box 970, The FOUNDRY, Cleveland.

FOR SALE

Electric Steel Foundry equipped to make castings ¼ pound to 6000 pounds. Building constructed of steel brick concrete also fire proof pattern storage and pattern shop. Foundry modern and equipped for production, now working 100% defense with orders on hand for many months. Clientele A-1. Reason for selling, ill health. This proposition will bear investigation. Address: Box 121, The FOUNDRY, Cleveland.

BRASS FOUNDRY & MACHINE SHOP FOR SALE

Entire plant or controlling interest only. Foundry at present idle, but machine shop operating on 100% defense work. Address: Box 135, The FOUNDRY, Cleveland.

FOR SALE OR LEASE

Gray iron foundry for castings up to 5 ton in Southern New Jersey. Approximately three acres of land. Low tax district near Philadelphia. Address: Box 136, The FOUNDRY, Cleveland.

FOR SALE

Completely equipped foundry and stove factory on railroad siding, now in operation located in mining town in Northern Mexico. For particulars address: F. P. Low, Apartado Postal 3, Parral, Chih., Mexico.

FOR SALE

Small grey iron foundry with limited nonferrous facilities in active Gulf Coast area. Now in operation. Address Box 108, The FOUNDRY, Cleveland.

FOUNDRY FOR SALE

Small but fine foundry for sale in Reno. The only one in the state of Nevada operating for customers. Excellent profits guarantee. Selling on account of army service. Address: Galli Foundry, Reno, Nevada.

For Sale

AIR COMPRESSORS

BELTED—176 ft., 355 ft., 540 ft., 676 ft., 752 ft. & 1300 ft.

ELECTRIC—355 ft., 528 ft., 676 ft., 807 ft., 1302 ft., 1723 ft., 2022 ft., 2200 ft., 2800 ft., 3600 ft., & 5000 ft.

STEEL TANKS

9—5000 gal., 11,500 and 18,000 gal. cap.
17—1000 bbl., 4000 bbl. and 10,000 bbl. cap.

TANKS BOUGHT AND SOLD
R. C. STANHOPE, INC.
60 East 42nd St. New York, N. Y.

Classified Advertising

For Sale

EQUIPMENT IN STOCK

GUARANTEED IMMEDIATE SHIPMENT

MISCELLANEOUS ITEMS

(1)—No. 60 Crucible Fisher Stationary Furnace, oil fired with new lining and cover.
(2)—1¾" cap. Shuster Power Sprue Cutters.
(4)—Large Flask Vibrators.
(1)—8-ft. Diameter Simpson Sand Mixer.

AIR COMPRESSORS & BLOWERS

(1)—No. 4 Wil. Green Positive Pressure cap. 13-cu. ft. per rev.

ELECTRIC MONORAIL HOISTS

(30)—¼ to 5-ton, 1 and 2 motor, Fl. and Cage operated, 220/440-volts, 3-PH. 60-CY. 110 and 230-VDC.

OVERHEAD ELECTRIC TRAVELING CRANES

(1)—To 50-tons cap. 18'0" to 91'0" span, 220/-440-volts, A.C. and 230-VDC. We operate the largest crane rebuilding plant in the country. Send us your specifications for Cranes, Electric Monorail Hoists, Crane Motors, Standard Motors, Steel Buildings and Runways. We can quote you on equipment rebuilt to your specifications.

T. B. MacCABE CO.
4304 CLARISSA ST. PHILADELPHIA, PA.

FOR SALE

"JEFFERY" Single Roll Coal Crusher—Size 30" x 30" capacity 60-70 tons hourly also "JEFFERY" Swing Hammer Pulverizer—M.D. —Type A-24" x 12"—Capacity one ton hourly.

Globe Trading Company
920 W. Lafayette Blvd. Detroit, Mich.
Cad. 0198

REBUILT USED EQUIPMENT

Molding machines, all types; tumbling mills; furnaces; cupolas; air compressors; hoists; rammers, all types; ladles, all types; sand mixers; sand blast tanks; core machines, etc. All equipment rebuilt and guaranteed. All sizes used steel flasks.

HAYNES FOUNDRY EQUIPMENT COMPANY
1734 Lake St. Kalamazoo, Mich.

SECOND HAND MACHINERY

COMPLETE SAND DRYER
Rotary drier 80" in diameter and 40' long. Also all necessary auxiliary equipment including conveyors, elevators, exhaust fan, motors, starters, etc. Address: Box 994, The FOUNDRY, Cleveland.

FOR SALE

1—No. 275 Oil Fired Tilting Crucible Furnace Suitable for Non-Ferrous melting. Address: Box 129, The FOUNDRY, Cleveland.

CUPOLA BLOWER

Piqua No. 5½, 4800 c.f.m. 16 oz. pressure at 210 R.P.M. Suitable for cupola melting from 10 to 20 tons per hour. Also 50 HP, 3 phase, 60 cycle, 440 volt motor 900 R.P.M. Starter compensator, belt and pulleys complete. Address: Box 150, The FOUNDRY, Cleveland.

FOR SALE

1 Battery of three Coleman Double-End Transrack Gas Fired Core Ovens, complete with Heat control. Rack size 40" wide x 52" long x 68" high. Good condition. Price reasonable. Address: Box 127, The FOUNDRY, Cleveland.

For Sale

SPECIAL DEFENSE BARGAINS

Blowers-Fans-Exhausters for Dust, Ventilation, Combustion. Rotary, Multistage, Multivane for all services, hundreds in stock, send specifications for your need.

Air Compressor, Worthington 52' cap. vertical feather valve. Worthington 8½ x 10 horiz. double acting approx. 225' cap. Many others also receivers.

Furnaces for Brass and Aluminum Melting—Hausfeld Tilting Brass or Aluminum open flame, 400 lb. brass cap.; Booth Electric 725 lb. brass cap. with instruments. Stationary Furnaces, swing top for crucibles No. 60 to No. 150 and open top for iron pots up to 300 lb. aluminum.

Molding Machines—No. 75-J Osborne jolt-squeeze portable, Osborne Stationary Jolt-squeeze-strip or lift 14 x 23 x 6" lift, hydraulic controlled draw. Arcade type portable squeeze—"Berkshire" 34" wide stationary air squeeze. "Tabor" 8" cyl. air squeeze "Battenfeld" (Johnston & Jennings) stationary jolt squeeze; 5 in stock. Adams —Stationary hand squeezers 48" wide 2 in stock. Mumford — Stationary Air Squeeze 14 x 18" platen.

Crane Ladles spur geared rim pour 3 tons cap.

Sand Blast Room—All steel 9'-10" x 20'-9" operators grilled table 3' x 10', down draft dust exhaust—8' ceiling. Air inlet thru ceiling with 1000-lb. sand capacity pressure generator tank.

Core Ovens—2 portable insulated gas fired 4 shelves each.
1—with shelves 37" wide x 22" deep 6" high.
1—with shelves 29½" wide x 22" deep by 7½" high.

AIR HAMMERS for chipping, Ingersoll portable air-grinder.

We have many attractive machines listed. Send your inquiry with full specifications for your AIR & FOUNDRY needs.

CLIFTON MACHINERY CO.
1023 W. 6th, CINCINNATI, O.

WELDING EQUIPMENT

Welding, Cutting, Aircraft, Sheet-Metal, Soldering Outfits, Torches, Regulators and Gages, Acetylene Generators, Supplies, Electric Arc Welders. SUPERIOR OXY-ACETYLENE CO., HAMILTON, Dept. B, OHIO.

CENTRIFUGAL COMPRESSOR

350/400 Cfm @ 35 lbs., 3 stage Allen & Billmyre, 6 x 6½ Centrifugal Compressor with 15 H.P. 3600 RPM AC motor drive.

SAND VIBRATOR

Jeffery-Traylor, shaker type CVS-8, 6" wide hand deck, capacity 7 to 8 tons sand per hour; with 15 cycle, 110 volt, single phase vibrator motor generator set. Write, wire or phone.

THE MOTOR REPAIR & MFG. CO.
1552 HAMILTON AVE. CLEVELAND, OHIO

REBUILT

BLOWERS—FANS—EXHAUSTERS

Roots-Connersville positive cupola blowers. Centrifugal blowers for gas and oil burning. Sand blast, grinder end dust exhausters. Ventilating fans.

GENERAL BLOWER COMPANY

406 N. Peoria St. Chicago, Ill.

FOR SALE

1—TYPE L.F.X. DETROIT ROCKING ELECTRIC FURNACE rated 500 lbs. capacity per charge—with extra shell, transformer 175 KW—4600 volt, 60 cycle, instruments and panel. Address: RILEY STOKER CORP., FT. OF WALKER ST., DETROIT, MICH.

FOR SALE

1—Noble Brass Separator.
1—Blodgett Core Oven—gas fired.
1—Oil Tank & Oil Pump.
1—Rockwell Stationary Brass Furnace No. 80 pot. Lined and never has been used, which has a Spencer Turbo 16 ounce pressure, 635 cfm.
1—Cut-off Saw.
1—Otis Elevator with a 7 x 8 platform, 4000 lb. capacity.
1—Dietrick Sand Testing Equipment.
1—Grinding Stand, 30" dia. 3" face, motor driven 20 H motor, variable speed.
1—Swing Grinder, only used 2 weeks.

HAYNES FOUNDRY EQUIPMENT COMPANY
1734 LAKE ST. KALAMAZOO, MICH.

For Sale

FOR SALE

1—HP Sand Cutter.
1—Portable Howe Platform scales. (4 ft. square platform).
1—No. 4 Root Positive Blower.
7—JW 275 J Osborne Jolt Squeezers.
1—Pridmore 24" x 8" draw.
2—Pridmore 14" x 6" draw.
2—Milwaukee Jolt Squeezers.
6—Osborne J 75 Jolt Squeezers.
4—International JS 2 Jolt Squeezers.
3—30 x 48 Sly Tumbling Mills. (Motored with 5 horse motor Jones reducer individual drive).
1—Newton cupola 40" shell with Sturtevant Blower.
1—Sturtevant No. 13 Positive Blower with Morse Chain Drive and 125 hp G. E. Induction Motor BLOWER—High pressure rotary blower. Bottom inlet, 29" d. Top outlet. Blower chamber (oval section) 75" wide x 68" high x 71" long. Two 7" D. bearings each end. 20" long bearing caps plus 14" gear case one end, and 14" pinion overhang other end, make total length app. 12 ft. Wt. (without motor) app. 30,000 lbs. Rated when new 13400 C.F.M. at 18 oz. pressure when turning 200 r.p.m.—require 125 hp.

DRIVE—12" face 1½ pitch Morse Chain 104 pitches long. 19 tooth motor pinion. 55 tooth driven sprocket.

MOTOR—G. E. induction motor 125 hp type 1-154, 440 v-3c, 60c. 585 r.p.m. Model No. 9564, Serial No. 4025601.

CONTROLS—G. E. T108 Controller No. 560087, 15 Resistor Bank.

1—Electric Melting Furnace—Heroult type Electric Melting Furnace, originally designed for 2000 lbs. to 2500 lbs. capacity. This furnace shell was later re-designed for 3300 lbs. capacity (approximately 12 to 14 tons per day), complete with transformers (2200 volt primary—90 to 110 secondary) and controls. Automatically operated electrodes, hand operated, gear driven, tilting device. One extra ladle, large quantity of 3" electrodes, set of ingot molds, one electric pump for the water system and piping for water cooling, excellent condition. 3 phase. Total capacity consumption of Power 600 K.W.

1—Molene Hand Squeezer.
Core Plate, Aluminum 79—16 x 35.
Core Plate, Composition 100—7½ x 32.
Aluminum Ribbed Core Plates—

6"	x 6"	x ¼
1?"	x 16"	x ¼
5⅛"	x 21½"	x ¼
11"	x 21½"	x ¼
9"	x 14"	x ¼

3—300 KVA. 7200-440V transformers. These transformers are in first class condition.

A shot or sand blast room approximately 8' x 10' x 7' with a 6' diameter turn table with elevator, sifting and pit equipment. Practically new.

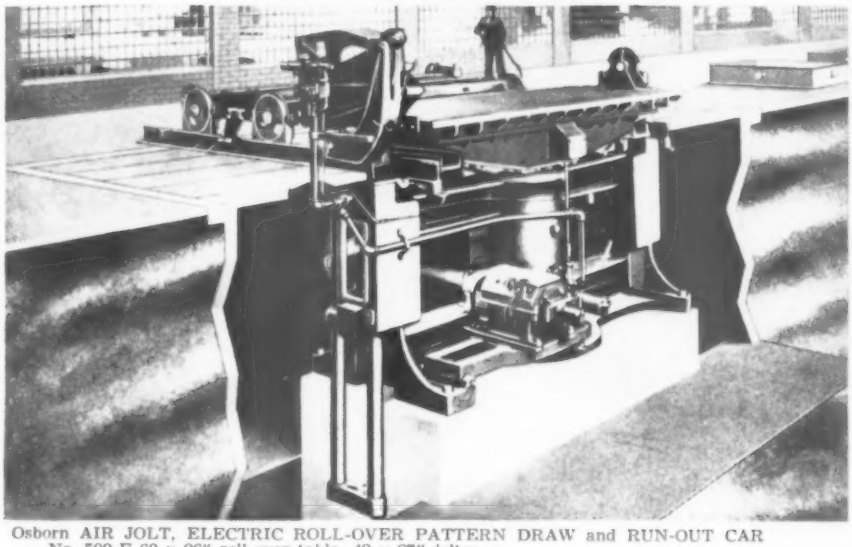
1—12 x 14 Chicago Pneumatic Air Compressor horizontal, 75 H motor, starter and switch.
1—10 x 10 bury, horizontal Air Compressor, V-belt drive, with starter and switch, 40 H motor.
1—Ford Engine Compressor with V-belt drive, switch and starter, with 20 H motor.
1—New Haven Sand Blast Barrel, 36 x 46 with 3 H motor and speed reducer.
1—Duster Rester, practically new, 12 x 8 x 7 with forty-eight 8" Pangborn bags.
1—No. 13 Ball-bearing Exhaust Fan, with 5 H motor, V-belt drive.
1—Whiting 78" Cupola.
1—36 x 48 Sly Tumbling Mill, with 1" shell, practically new.
Air Tanks—many sizes.
Rebuilt Chipping Hammers (rebuilt in factory, guaranteed)
2—Generator Tanks.
3—30 x 48 Tumblers with Jones Speed Reducer, with 5 H motor.
1—24 x 60 Tumbler with Jones Speed Reducer, with 5 H motor.
1—Plain Bumper, with 5' square table.
1—International, type F, 26 x 8" draw, air jolt, air roll, and air draw.
1—International, type F, 30 x 12" draw, air jolt, air roll, and air draw.
60—Steel Flasks, 18" x 18", 10" cope, 3½" drag.
1—Elevator, 4000 lb. capacity, 10 H motor, 7" x 8" platform.

HAYNES FOUNDRY EQUIPMENT COMPANY
1734 LAKE ST. KALAMAZOO, MICH.

SCULLY Reconditioned Foundry Equipment

★ ALL SCULLY EQUIPMENT IS REBUILT AND OVERHAULED IN OUR OWN, NEW MACHINE SHOP

OSBORN MOLDING MACHINE

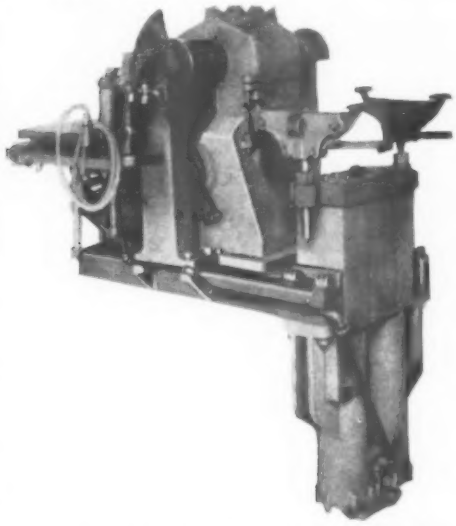


Osborn AIR JOLT, ELECTRIC ROLL-OVER PATTERN DRAW and RUN-OUT CAR
No. 509-E 60 x 96" roll-over table, 42 x 87" jolter.
No. 513-E 36 x 124" roll-over table, 36 x 112" jolter.

INTERNATIONAL MOLDING MACHINES

International Type "F" comb. jar ramming power turn-over, power draw (late type enclosed cyl. model) 27 x 16" draw, 1600 lbs. cap. @ 80 lbs. press.

International Type "F" comb. jar ramming power turn-over power draw, 26 x 12" draw, 900 lbs. cap.

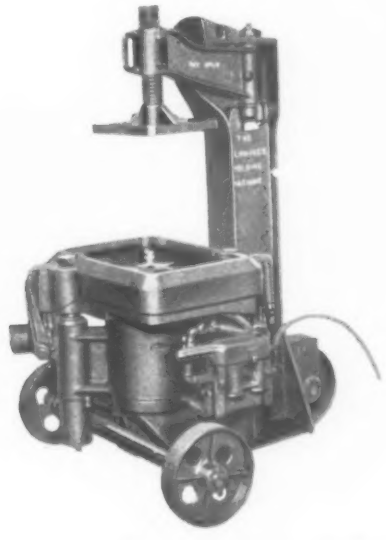


Type "F" 49 x 16" draw, comb. jar ramming, power turn-over and power draw, fitted with air equalizers, rollers in the draw section and hand operated core box clamps (rollers can be readily removed) jar plate 100" long, 6000 lbs. cap. @ 80 lbs. pressure.

Magnetic Mfg. Co. size 30" dia. x 80" long drum MAGNETIC SEPARATOR 115V 4.5 Amps. Type F-3, complete with shunt wound 3 HP DC 1700 RPM Motor, Elevator 10'4" O/A height, 18" width, 22" depth.

JOLT SQUEEZE STRIPPERS

No. 142 Milwaukee, stationary, 1200-lb. cap. @ 80 lbs., 6" draw, table 19 x 35"—open end type.



No. 113 Milwaukee, open end type, portable, 500-lbs. cap. @ 80 lbs., 6" draw, 16 x 35" table.

Osborn No. 82 STRIPPING PLATE JOLT SQUEEZER, 46" between rods, 10" draw, 1200 lbs. jolting cap., 1000 lbs. stripping cap. 24 x 36" table, pin lifts 12" part one way, 36" the other.

Nicholls Type "D" stationary heavy duty JOLT SQUEEZE & PATTERN DRAW, squeeze piston 14" jolt piston 6", draw 2-6"—distance between strain rods 40" take approx. 15 x 24" flask.

MOLDING MACHINES

No. 49 Davenport jolt roll-over draw, outside flask cap. 50 x 72" pattern draw 18"—4500 lbs. cap. @ 80 lbs. pressure, jolt cyl. dia. 14".

No. 24 Davenport jolt roll-over draw, stationary, outside flask cap. 26 x 40"—10" draw, 1000 lbs. cap. @ 80 lbs. pressure.

TABOR stationary 30 x 12" draw, jar power roll-over, power draw with air clamps, table 30 x 40".

No. 330 Arcade portable, jolt roll-over, squeeze pattern draw, 10" draw, distance between uprights 44".

Osborn No. 332 jolt roll-over and squeeze, flask cap max. length 36" width 26" pattern draw 9" jolt cyl. dia. 7", 750 lbs. jolting cap. @ 80 lbs. press., 44" between uprights.

HERMAN Independent Turn-Over and Pattern Drawing Device

60 x 84" roll-over, 60 x 72" bumper, 10,000 lbs. cap. @ 80 lbs.

60 x 72" roll-over, 60 x 72" bumper, 10,000 lbs. cap. @ 80 lbs.

40 x 56" roll-over, 40 x 58" bumper, 3000 lbs. cap. @ 80 lbs.

Osborn "Little Wonder" CORE ROLL-OVER MACHINES

No. 45-P, Length O/A 24", Width O/A 20", pattern draw 8", height of roll-over table from floor 28".

No. 46-P Length O/A 32", Width O/A 24", pattern draw 8", height of roll-over table from floor 24".

AMERICAN SANDCUTTERS

American Fdry Model "K" heavy duty type, size 72, equipped with Buda Type "MU" 20 HP Gas Engine.

Model "AA" size 62, 66" between tractor wheels, 4" face—O/A width 85" Length 96" and Height 80"—equipped with 4 cyl. Waukesha Gas Engine.

Cleveland-American (similar to Model "K") 84" spiral cutting cyl., 36" dia., 92" between tractor wheels, 5" face—equipped with Cleveland 3-phase 60 cycle 220V AC Motors, Cable and Take-Up Reel.

NO. 2 DEMMLER CORE BLOWING MACHINES

EXHAUST TUMBLING MILLS

40" square x 84" long Sly, ⅞" plate door opening entire length of barrel, renewable trunnions, pulley drive.

LOT 34" dia. x 74" long Whiting, door opening entire length of barrel, renewable trunnions, clutch pulley drive.

MISCELLANEOUS

American Pulverizer Type "S" CORE CRUSHER 30 x 35 opening on base plate direct connected to American Elec. 35 HP 3/60/440V 570 RPM AC Motor.

Productive Eqpt. approx. 3 ft. wide, 8 ft. long VIBRATING SHAKE-OUT SCREENS, 3 ft. high, 62" width O/A 1 unit having perforated plates, extended shaft (requires 5 HP 1800 RPM Motor for operation).

No. 3, 8 ft. dia. double muller SIMPSON MIXER, arranged for motor drive, but without motor, with gear reduction and outboard bearing, mullers 11 x 34" dia.

No. "0" 3 ft. dia., single muller type, pulley drive.

SCULLY MACHINERY & EQUIPMENT CORP.
(Formerly - Foundry Division of Scully-Jones & Co.)
2031 WEST 74th STREET (Phone PROspect 8770) CHICAGO, ILLINOIS

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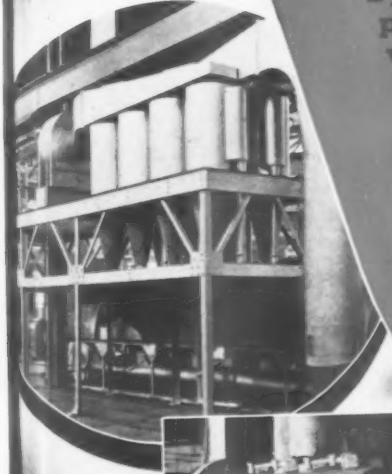

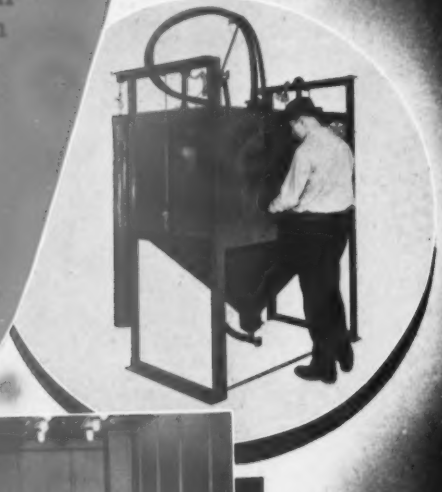

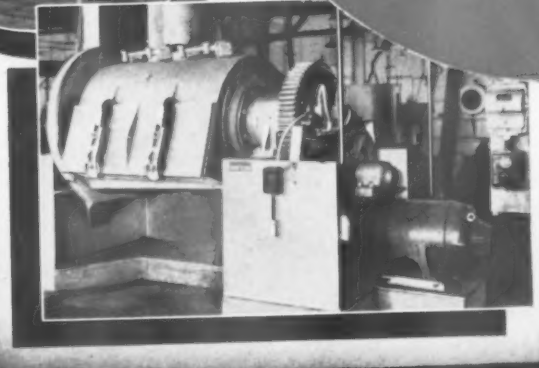

PARSONS
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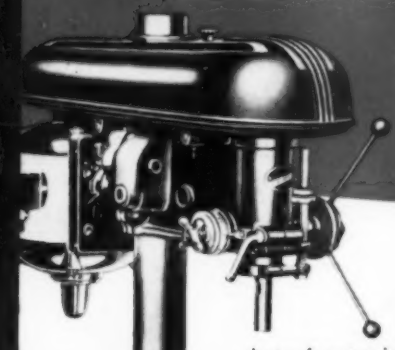
Low-Cost DELTA Machines have Proven their Case!

in Foundry Machine and Pattern Shops



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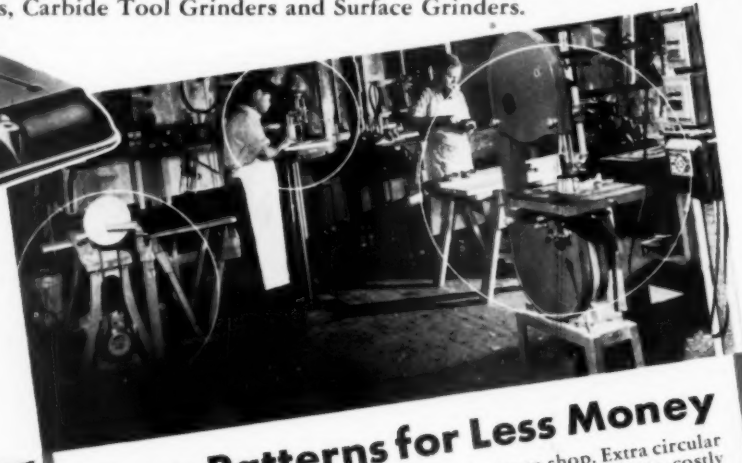
Actual experiences of hundreds of foundry machine shops have definitely proven that Delta machines give you more production at lower cost—that you can quickly step up production and at the same time make your machine shop more flexible—without tying up a large amount in capital goods equipment. Delta machine tools offer you low first cost, unusual adaptability, advanced design, portability—plus many features and added efficiency not found in machines costing three or four times as much.

Get the full story on Delta machines today! The complete Delta line for the foundry machine shop includes single- and multi-spindle 14″ and 17″ Drill Presses, Abrasive Finishing Machines, Metal Cutting Band Saws, Cut-Off Machines, Grinders, Carbide Tool Grinders and Surface Grinders.



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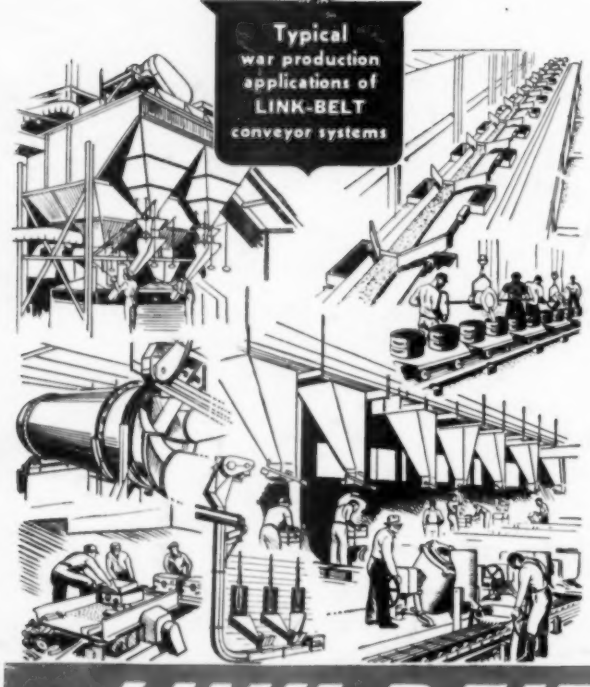

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For over half a century Link-Belt has specialized in the engineering and manufacture of every type of mechanical elevating and conveying equipment for practically every industry and material. Link-Belt foundry equipment engineers are ready to assist you in the proper application of the right type of sand preparation and conveying equipment to save man hours, speed production and produce more uniform output.

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